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TRANSACTIONS

OF THE

National Dental Association

AT THE

SEVENTEENTH ANNUAL MEETING

Kansas City, Mo., July 8–11, 1913

AND OF THE

Southern Branch

AT THE

FIFTEENTH ANNUAL MEETING

Old Point Comfort, Va., July 22–24, 1913

PHILADELPHIA
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DISCLAIMER.

The National Dental Association, although formally accepting and publishing the reports of the various Sections, and the Essays read before the Association, holds itself wholly irresponsible for the opinions, theories, or criticisms therein contained, except when otherwise decided by special resolution.—*Constitution.*

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SEVENTEENTH ANNUAL MEETING

OF THE

National Dental Association,

HELD AT

KANSAS CITY, MO., JULY 8 11, 1913.

TUESDAY—First General Session.

THE first general session of the seventeenth annual meeting of the National Dental Association was called to order at 10.30 o'clock Tuesday morning, July 8, 1913, in the Century Theater, Kansas City, Mo., by the president, Dr. F. O. Hetrick, Ottawa, Kansas.

The President introduced the Rev. D. D. MUNROE, Kansas City, who invoked the divine blessing on the deliberations of the association.

The President next introduced Mr. HUNT C. MOORE, Kansas City, assistant city counselor, who, instead of Mayor Jost, welcomed the association on behalf of the city, as follows:

Address of Welcome.

Mr. President, ladies and gentlemen, —It is not often that I have the honor of representing the mayor on occasions like this—because he has a weakness, whenever there are ladies present, for abandoning all work at the City-hall and taking his automobile in hot pursuit. Today, however, he is detained at the City-hall with some city officials from Kansas City, Kansas. I understand he is giving them some pointers on city government and a lesson or two from the democratic code, and we don't object to that. Now, I am not going to make a political speech, Mr. President, but if I ever run for office I certainly would like to have this bunch of fellows back of me. [Laughter.]

The mayor wishes me to extend to you a most generous welcome. He wants you to feel at home and "be one of us." I am glad on this occasion that I can associate with you gentlemen without fear or trembling. Ordinarily, when the name of a dentist is mentioned in my presence I have a touch of "buck ague" and I imagine myself in a soft-seated chair, and every now and then jumping from one side of the room to the other. But, notwithstanding this, I

realize that you are a lot of good fellows and never put a fellow entirely out of commission as do the surgeons and doctors sometimes. I am familiar with all of your instruments and just how you use them, and know which way a fellow is going to jump when the current is turned on.

To you dentists who have come here without your wives or sweethearts, I want to say while there are two police-courts in this city, that the city counselor can issue as many pardons as they can make convictions, and I want you to feel that the town is yours and that you are secure from molestation. [Applause.]

The bankers of our city do not have much to do with the lawyers of the town, but I have seen their advertisements in which they claim to have a surplus on hand. I want to say to you that if some of you visitors don't use a part of that surplus it is not my fault. We have a city with sixty miles or more of boulevards, and it is known as the greatest boulevard city in the world. We are justly proud of it and we want you people to see the city and take the inspiration you obtain back to your homes. Let me tell you another thing—confidentially—that all of your friends who are practicing dentistry here, while they may not admit it, are quite wealthy; they all have automobiles, so don't you let them "streetcar" you around while you are seeing Kansas City. [Applause.] Make them ride you in their automobiles and if they run away and will not do it, come down to the City-hall and I will see that your wants are supplied.

But seriously, my friends, we are proud to have this great convention in our city. We are proud of the splendid work that you are doing for humanity, and we congratulate you upon the progress you are making. Your organization is unlike many of the organizations of today, which combine solely for the purpose of raising prices and cornering the market. I know that your splendid organization will never encourage its individual members to raise the price for making an unfortunate a set of teeth! There is nothing but good to come from a meeting like this or from an organization like this. It is to the credit of you men, individually and collectively, that you are making the fight you are. I noticed in the press of yesterday that you are busying yourselves with proposed laws for the preservation of health, and among them the compulsory dental treatment of children. Nothing contributes so much to a strong and rugged body as good teeth, and, my friends, compulsory dental treatment for children is as important as compulsory education of children—which has been tried and found to be a good thing; and do not become discouraged—for this movement which you have inaugurated will bear fruit and eventually become the law of the land. It will be to your everlasting credit to realize that you and your associates were pioneers in this great work. In order for one to have a strong and vigorous mind it must be housed in a strong and healthful body, and every effort made toward protecting the body from the ills that come from diseased teeth should be encouraged by all right-thinking people. God speed the splendid work your great organization is doing along this line, and may it accomplish all of its worthy ends!

Finally, I want you all to feel at home. Be "one of us." Have a good time, and if there is anything you want and can't

get, come down to the City-hall and I will see that you are properly cared for.

Again I extend a heartfelt welcome. [Applause.]

Response to Address of Welcome.

Dr. Geo. E. Hunt, Indianapolis, Ind., responded to the address of welcome on behalf of the association, as follows:

Mr. President, Mr. Moore, ladies and gentlemen,—It is a privilege and a pleasure for me to respond to this cordial welcoming address. I feel that we are going to have a most excellent meeting here this week, one replete with wisdom and overflowing with zeal. I feel that my little talk this morning should be in the nature of thanksgiving, in the nature of grace before meat—that I should say, "For what we are about to receive may we be truly thankful." And I trust not one here in this convention is as ignorant in regard to grace before meat as the little lad I shall tell you about. The Sunday-school teacher was trying to instil into the class the desirability of thankfulness for the good things of life, and turning to one little lad, said, "Tommie, what is it your father says when you sit down to the table and before you eat?" Tommie replied, "He says, 'Go easy with the butter, kids; it costs forty cents a pound.'" [Laughter.]

We come to you, Mr. Moore, from the four quarters of the earth. We come from the frozen North; we come from the sunny South; we come from the wild and woolly West, and from the effete and effulgent East. In the year since our last meeting we have had our troubles combating the perplexities of the high cost of living, but after the glorious Fourth had gone by and we were all safe and sane again, and the time had come for the annual reunion, we dismissed our cares, collected a few accounts, took our tooth-brush in one hand and our palm-leaf fan in the other, and hit the trail for the city on the Kaw.

The profession of dentistry is just coming into its own, and this week's meeting in your charming city will plant another milestone of progress on our way out of the wilderness in which all branches of the healing art have been groping in the past. We, in dentistry, have been harassed on one hand by the indifference and ignorance of the people regarding what we were able to do for them, and on the other by a lack of appreciation on the part of a large part of the profession itself regarding our duty to the public. Our troubles may be illustrated by the story of the two hunters who were once traversing a wild portion of the West, when an enraged buffalo bull attacked them. One of them promptly climbed the only tree within miles and the other dove headlong into a cave. After a moment or so the man in the cave came rushing out. The bull promptly charged him and he again precipitately entered the cave, only to as hastily make his exit from it. When this had been repeated several times, the man in the tree yelled to his partner, "Stay in the cave, you blamed fool!" And his partner replied irritably, "You go to thunder!—you don't know anything about this cave; there's a bear in the cave!"

But brighter days are coming to the profession and to humanity through the profession. Better health, better mentality, and greater efficiency is what we offer the world, and the world is preparing to accept it.

As I came through this great commonwealth of Missouri last Sunday and gazed through the car windows upon the acres after acres of ripened wheat, and mile after mile of growing corn, I said to myself, Surely this is the land of plenty, this is the Promised Land; and as I sat there looking over the fields and thinking of the bumper harvest that Missouri will experience in a few weeks, my imagination carried me forward a few months, and I could see the golden kernels, ripened as they will be then, part of them going to fill out the rotundity of the justly famous Missouri mule, and the other part being shipped to Peoria, Ill., to be turned into an also justly celebrated variety of corn-juice.

Mr. Moore, we appreciate your warm words of welcome, and we know we are going to like your town. We are prepared to like not only the town, but its citizens, and although, when we leave, the calves of our legs may be a little sore from climbing up and down your altitudinous streets, and although all our handkerchiefs may be in the laundry from mopping our brows, we hope that none of your citizens, after we leave, will feel it necessary to say it was the dentists of the National Dental Association who put the "can" on Kansas City. [Applause.]

The next order of business was the report of the Executive Council, by Dr. H. J. Burkhart, chairman, as follows: The Executive Council directs me first of all to report the resolution offered yesterday in the general meeting of the Executive Council, the Executive Committee, and those interested in formulating the new rules for this association, as follows:

Resolved, That in view of the apparent misunderstanding which exists relative to several matters in connection with the transition from the old to the new constitution, it is the sense of this meeting that the following action shall be taken:

1st. That the Officers and Executive Council elected at Washington shall conduct this meeting as under the old constitution, except that the Council will report to the House of Delegates, after it is organized, instead of to the general body.

2d. That the House of Delegates for this session shall consist of one delegate representing each state society which has voted to affiliate with this association, and that none of such delegates shall hold over for 1914, unless re-elected by their respective societies.

3d. That such house shall hold its first meeting on Wednesday, July 9th, at 2.30 P.M., in the "White room" at the Baltimore Hotel.

4th. That the House of Delegates shall select the place of meeting and elect the general officers for the ensuing year; also, a board of nine Trustees, all of whom shall serve for one year only, and shall transact all other business appertaining to the conduct of the affairs of this association, subsequent to this meeting.

5th. That the new Constitution and By-laws shall be in full force as applied to the 1914 meeting.

6th. That all former members, and new members who wish to be credited as members for the current year, shall pay five dollars dues, as per statements already sent out by the Treasurer, and that the payment of said dues shall cover membership up to January 1, 1914.

7th. That hereafter the fiscal year of this association shall agree with the calendar year, and dues of one dollar per member for the year 1914 shall be payable January 1, 1914.

8th. That all members of state societies which have voted to affiliate with this association, who are not already members, shall be extended all privileges of membership at

this meeting, without payment of dues, but will not be entitled to receive the bound volume of the Transactions.

Dr. Burkhart moved the adoption of the resolution, which was duly seconded and was carried unanimously.

Dr. Burkhart. The Council suggests that all members present belonging to state societies which have not affiliated hold a meeting sometime during the day or evening, and select one person to represent them in the House of Delegates, which will convene at 2.30 tomorrow, and certify the delegate that has been selected, to the secretary of this association before 9 o'clock tomorrow morning, so that the Council may make up a list of duly accredited delegates to the first House of Delegates to meet tomorrow.

The Executive Council will meet in Parlor D, Hotel Baltimore, at 3 o'clock this afternoon, and you are requested to bring all business matters before the Council at that time. There will be another meeting at the same place at 9 o'clock tomorrow morning, and the Council specially requests that those having any sort of business connected with the association will present it at one or the other of these sessions, so that we may clean up the business of the old association before the House of Delegates takes charge of the new.

Dr. Burkhart then announced the program for the day, and said that each day a daily program would be printed and distributed among the members outlining the entire program for the day.

Motion was made and carried that the report be adopted.

Dr. T. B. Hartzell, vice-president from the West, took the chair, while the president, Dr. F. O. Hetrick, Ottawa, Kans., read his annual address. [See page 41.]

Dr. Hartzell appointed the following as the Committee on the President's Address: Drs. E. S. Gaylord, A. R. Melendy, and Burton Lee Thorpe.

The committee reported at a later session as follows:

REPORT OF COMMITTEE ON THE PRESIDENT'S ADDRESS.

Mr. President and members of the National Dental Association,—In review of the several recommendations in the President's address—

We approach the radical change in the date of our annual meeting with a degree of apprehension, as valid arguments present for and against such change. The subject is not new, having several times been considered by this body. We suggest this compromise: Adapt the time of our meeting to the locality, making the date sufficiently past the heated term to insure immunity. We recommend, however, that the 1914 meeting be held in the East about July 15, 1914, making it possible for the members so desiring to attend our meeting and the Sixth International Dental Congress in London, Eng., August 3 to 8, 1914.

We heartily commend the proposition to finance and establish the Journal as soon as possible. With the increased annual income under our plan of reorganization, it seems feasible to accomplish this within the time indicated in the address—1915.

In relation to the work of the Scientific Foundation Fund and Research Committees, we heartily concur with the address, and would emphasize the obligation created by the opportunity offered our profession in this great advance, to benefit humanity.

Allusion to the Relief Fund is also commended by your committee. The wisdom of making such provision for our unfortunate members is both wise and justified.

The appointment by Governor Cox of Ohio of Dr. Homer C. Brown as member of the State Board of Health is gratifying, and we believe we should work shoulder to shoulder

with the medical profession upon these boards.

Respectfully submitted,

BURTON LEE THORPE,
A. R. MELENDY,
EDWARD S. GAYLORD,
Committee.

Dr Hetrick resumed the chair, and introduced Dr. WESTON A. PRICE, Cleveland, Ohio, chairman of the Scientific Foundation Fund Committee, who reported for the committee as follows:

REPORT OF COMMITTEE ON SCIENTIFIC FOUNDATION FUND.

It is a great pleasure for me to be permitted to make the report for the Committee on Scientific Foundation Fund, and I wish to assure you that I am not going to bore you with a long statement of details, but will take only a few minutes to report some of the possibilities open to the dental profession.

I am sure that it is not necessary for me to remind you that a large percentage of the infections that enter the human body enter by way of the mouth, or that a great many septic conditions have their origin in the mouth. You have been listening to that during the last year through papers on oral hygiene; you are interested, however, in the larger question of our duty to humanity. The first part of the subject states clearly the need for this work; and, as I see it, the need of the hour is not that we shall approach the subject only from the standpoint of the pathologist, but that we should establish our position in line with all the great professions of the world. I am going to ask you to look with me at the march of civilization;—we shall see that all down through the thousands of years that have been passing, all of the great civilizations have had in their midst these great infections that have not only swept off the total population within every twenty-five years, but sometimes nearly the entire population of a district in a single year. There have been instances where the population was wiped out so completely that not one person was "left to tell the tale" of a previously large population, and I want to show to you a picture of such a civilization as that of Sweden, where one-twenty-fifth of the population died every year of one single infectious disease. That was twenty-five years ago; today we have only one in a million dying of that same disease. And when we think how the great sources of infections so common a few years ago are one by one being stamped out and no longer curse humanity, we are thrilled with joy. But this joy is soon mixed with pain—for there yet stands the great source of infection, the largest of them all, the one that has caused the largest amount of suffering and has afflicted the largest number of people, and we have done practically nothing to emancipate humanity from it—I speak of oral and dental infections, which are the most universal and the most serious of all that afflict mankind.

EMANCIPATION FROM FORMER SCOURGES.

I want you to see with me how the great emancipations from scourges have been accomplished. You only need to go into the study of any one particular disease. Let us look at the diphtheria scourge that a few years ago entered our homes and took from our families, in the United States alone, enough children every year to populate all the schools of

Kansas City. These lives have been saved by the coming of the antitoxin for diphtheria. How and why did it come? Because the great medical profession realized its responsibility to humanity, and had men who were willing to go into laboratories and work for the love of humanity and the love of truth, and find a means for relieving their fellow men from this dreaded disease. When measured by the value of a few horses, the value of a few dollars put into laboratories, the value of a few hours' time for research work, no investment can compare in returns and desirability to having had five, ten, or a hundred dollars invested in that research work. Yet, while this great work has been done and is being done, we, the dental profession, have done practically nothing.

Let us look at another example: We know that a large percentage of all babies born have been afflicted with hemorrhage of the newborn, and if you have gone into the hospitals for babies you have seen, up to a few years ago, that these babies were condemned to die. But something happened. There has come to the world a great thing, the surgery of the bloodvessels, because a profession cared! It was necessary to add to the blood of these infants some blood that had the power of coagulation. One evening, just a few years ago, there happened in New York this picture: A physician the father of a first child was sitting by his newborn babe, whose life was slowly but surely going out as had been the case in all the past with these babies, and as the eyelids and lips were getting bluer and the child's paroxysms getting slower in its desperate struggle for relief, this anguished father telephoned Dr. Alex Carrel, one of the men connected with the Rockefeller Institute, and asked him if he could not do something for this baby. His answer was affirmative, and he came quickly to the house of the heartbroken father and mother, put the father on the bed by the side of his baby, and with his new technique for the surgery of the bloodvessels successfully united the father's artery with the vein of the child and put some of his blood into the child's body. Almost immediately they could see a pink flush in the face of the baby, very soon it was crying and hungry, and in a few minutes it was nursing with avidity at its mother's breast. There was no period of convalescence; the baby that was dying but a moment before was now well, for the fatal hemorrhage had ceased. It was saved!—and all through the coming years these babies can be saved. Why? Because somebody cared enough for these babies and for the truth to place laboratories at the disposal of men, and men who cared for the truth enough to give their lives in making this research. Surely there has been no power known to history so great as this power of truth, which is revolutionizing the whole of civilization in our generation.

Look at the yellow fever scourge in Panama, in Havana, and in Mexico, where half the population at times were taken off, and the complete stamping-out of that scourge, and see the spirit that made that relief possible. Scientists knew, or thought they knew, that it was the mosquito that carried the yellow fever germ, but there were four hundred varieties of mosquitos. They thought it was carried by the female of one of these varieties, but did not know; they thought this mosquito must take the poison from a person sick with yellow fever during the first three days of that

person's sickness, and then must wait twelve days and bite a well man who would therefrom develop yellow fever. They could not experiment on animals by allowing the mosquito to bite them, because animals would not contract the disease; it was necessary that this experiment should be made on man. Men were not wanting, for Dr. Lozier and Dr. Corell of Washington came and offered to bare their arms to the mosquito. These men had even been sleeping in the soiled clothes of men who had died from the disease, willing to get this disease even when they knew that it meant almost certain death to them. Few men have ever given service with so little realization of sacrifice and so great a sense of privilege as did these men. One of them when he knew that he was doomed to die, wrote a letter to his wife saying that he thanked God for the opportunity that had come to him by solving the problem, and thereby to give this relief to humanity. Was it worth while? It was!

THE PRESENT OPPORTUNITY—A GOOD START MADE.

But that spirit of sacrifice, measured by a life, is not what we are asking of you today. We offer you the privilege of helping to support some trained men to go into laboratories and do the research work necessary to bring to humanity an emancipation from the dental scourges. The laboratories are waiting and ready for this work. I also want you to know that this great dental profession is alive to this opportunity! You can scarcely appreciate the favorable conditions without having gone from place to place as I have gone and seen the response to this opportunity. Society after society to whom this matter has been presented, has, when the members have been told of this plan, supported the movement almost to a man; many times, every person present volunteered to give money in support of the work. In the city of Columbus, when this project was presented before the dental society, though with only forty-two present, every person contributed, to the amount of $1200. When it was presented in Cincinnati, $2700 was subscribed and the first year's payment entirely made, and they are enthusiastic to do more. The profession of Cleveland has subscribed $4010 toward this fund to help men to go into the laboratories and do the work, and other societies have taken up the work with enthusiasm and earnestness; and all are standing shoulder to shoulder with a solid front. A substantial start has been made toward the same result in Iowa, Missouri, Kentucky, Indiana, Maryland, District of Columbia, Pennsylvania, Minnesota, Colorado, Tennessee, and Texas, and Wisconsin joins this month. The reports are not complete from any of these states, and from many we have no report except the substantial subscription secured at the time the plan was presented. The total amount of these incomplete reports is $12,640; and we regret exceedingly that we could not have known how much has been secured in each city and state to date. Some of the incomplete reports are as follows: Cincinnati, $2767; Columbus, $1200; Cleveland, $4010; Toledo, $500; Washington, $700; Louisville, $500; Pennsylvania and components, $782; Iowa State University Dental Alumni, $500, with several smaller amounts. It is essential to remember that this is entirely a report of progress, for in many places the

work has just started. Other states would have taken it up before this, had not conflicting engagements prevented the chairman of the committee from being present at their meetings.

GENEROUS TENDER OF LABORATORY FACILITIES.

Now I want to tell you something of the attitude of the public toward this movement. When this work became known to some of the great institutions of our country, they responded at once. One did not even wait for the committee to come, but sent for us and said we might have the use of their laboratories and they would give us every assistance. These free laboratories include privileges in the Cushing Laboratory for Pathological Research of the Western Reserve University, and the Case School of Applied Science Research Laboratory, both of Cleveland; Iowa State University Research Laboratories; Michigan State University Research Laboratories; Hygienic Department of the U. S. Department of Health of Washington; Bellevue Hospital Research Laboratory, New York; Cincinnati Hospital Research Laboratory; Parke-Davis Research Laboratory, Detroit; University of Chicago, and several other competent institutions, including more very choice facilities than we can probably use for some time.

THE PROPOSED PLAN.

When I have said to men with money, "Can you help us?" the almost invariable reply has been: "We have means for such good causes, but there are so many demands that we have to have something of an indorsement. What are your indorsements? What has the dental profession done in financial support and service for such work?" And there was nothing that I could point to that indicated that we have made the sacrifices which our professional responsibility demands of us. Your committee has undertaken to get this indorsement in two ways: We want a fund for immediate use, and that fund shall be raised from the entire dental profession—it will be a guarantee of their indorsement, and will also pay for the bread and butter of the men who are going into these laboratories.

This money from these different societies that I have spoken of is for that fund, and we are asking that the dental profession of each state shall give each year for five years an amount equal to the number of men practicing dentistry in it—that is, about $40,000 a year for five years from the United States, or $200,000 in all. On this basis, Ohio would be expected to subscribe $12,000—and already Ohio has subscribed $9000 of that $12,000. Indiana will, I am sure, do the same. Illinois and Wisconsin will doubtless do the same. And as we have gone from one society to another we have found that same response, not always as fully as in Ohio, but as sure and certain; and my appeal in behalf of the Scientific Foundation Fund is that you help us to present a solid front, thereby showing that the dental profession is united in the support of this work.

With regard to opportunities for help, I have to say that we have been negotiating with competent research workers and find that a large number of men who are very competent and whose heart is already known to be in this work can be available for the service of the National Dental Association. If we as a great profession will support this work, by some such method as the committee has outlined, backed by the National Association and supported by the

state societies and their component societies down to the very last man, then all the men back of this movement will have a strong bond of sympathy between them, for the profession will be united more closely than ever before—but, best of all, it will not be a despised profession! Never in my life have I been so proud of being a dentist as I am today, because of our opportunities, and I would not be anything else if I might for the asking, because the opportunities for us are greater, to my mind, than they are for any other calling or any vocation; hence I challenge you to join in this campaign for human emancipation from dental disease.

SHALL MEDICINE WIN THE REWARD?

If the dental profession does not do this, the medical profession will do it, and do it soon. I was told, just this morning, of another instance wherein one of the greatest institutions of the country, a body of medical men, were to be furnished to do this work that the dental profession has not done, simply because of the insistent need of it in the practice of medicine. As sure as the medical profession does it, they will have the credit, and they will deserve the credit. If we, the dental profession, are ever to deserve that credit, it will only be when we are willing to make real sacrifice. I wonder if there is one man in this room who would not feel unworthy of this great profession if he would not give at least half a day a year to help to rescue humanity from this scourge. While I was coming over on the train, a dentist said he wanted to give fifty dollars a year, and I think we shall find a large group of men who will be willing to do the same. In Cleveland we had a number of men give fifty dollars, and in Cincinnati the same, and some even one hundred dollars. Ours is the opportunity, and we can have exactly as much research work done as we are willing to plan a foundation for, and that foundation will be the moral and financial support and indorsement of the dental profession. Do you want insignificant, unsatisfactory work, done in a haphazard way in a few laboratories? No!—we all want a magnificent organization with a central institute, or with institutes in different parts of the country, where this work can be carried on by the best men, so that the entire world will look to the dental profession for help, and will acknowledge it as having wrought the greatest single service for the emancipation of humanity from its various afflictions.

The Executive Council has asked me to give to the members of this body the opportunity to say now whether or not they would like to have a part in this work. I do not present this as a plea; but as a privilege that is yours *now*.

RECOMMENDATION TO THE ASSOCIATION.

We will recommend to the association that the committee of three be changed to a commission of twenty-five, with an Executive Board of five to enlarge and carry on this work, and that technicians or assistants be engaged at once to enlarge the capacity and output of some of the men who are doing, gratuitously, the best private research at present.*

Respectfully submitted,

WESTON A. PRICE, *Chairman.*

The general session then adjourned until Wednesday noon.

* The opportunity was given to those present to make a voluntary contribution, and about $2500 was contributed.

WEDNESDAY—Second Session.

The general session was called to order Wednesday, July 9th, at 12 o'clock, by the president, Dr. F. O. Hetrick.

The first order of business was the report of the Committee on Necrology, which was read by Dr. E. S. Gaylord, as follows:

REPORT OF COMMITTEE ON NECROLOGY.

The Committee on Necrology begs to report the following on two of our prominent members who have died during the year:

Dr. Wilbur F. Litch.

DIED, at his home in Ardmore, Pennsylvania, December 25, 1912, WILBUR F. LITCH, D.D.S., M.D., aged seventy-two years.

Dr. Litch was born in Eastham, Mass., his ancestors being among the early settlers of Plymouth Colony, Massachusetts. His father was a minister in the Methodist Episcopal Church, and with his family removed to Philadelphia, where from an early age Dr. Litch lived and was educated. At eighteen years of age he entered the office of his uncle, Dr. I. M. Barstow, one of the famous dentists of Philadelphia, under whom he had a thorough training in office and laboratory work. In 1861 he received the degree of D.D.S. from the Pennsylvania College of Dental Surgery, and for three years he was a student of the celebrated Professor D. Hayes Agnew; later he received the degree of M.D. from the Jefferson Medical College, with the class of 1864–65. He served several years as surgeon in the United States army. His last assignment was as post surgeon at Post Yuma, Cal. He resumed dental practice in Philadelphia in 1871. He was appointed a professor in the Pennsylvania College of Dental Surgery in 1878, and in 1899 was made dean of the college, a position he held until 1909, when the College merged with the University of Pennsylvania Dental Department.

Dr. Litch was a member and ex-president of the Pennsylvania State Dental Society, of the Pennsylvania Association of Dental Surgeons, and of the National Association of Dental Faculties, a member of the National Dental Association and its vice-president for the East in 1907–08, an honorary member of the American Academy of Dental Science, Boston, Mass., a member of the Philadelphia County Medical Society and of the American Medical Association, and was for thirty years dentist to Girard College, Philadelphia.

Dr. Litch was an eminently practical and artistic and mechanical dentist. As early as 1876, before the introduction of the Richmond crown, he gave to the profession his method of making and applying the half-band gold crown for the incisors and canine teeth. He was a fine operator and a frequent contributor to the dental journals. For five years from 1882 he was supervising editor and contributor to the "American System of Dentistry," which was published in three volumes in 1887–88. The chapters contributed by him on Anesthesia and "Anesthetics" and "Crown and Bridge Work," and his wise selection of associate writers of recognized ability, gave to the work literary, scientific, artistic, and practical value as "the text-book of the century." In 1899 Dr. Litch became editor of the *Dental Brief*, which office he held until his death.

A Christian gentleman, artistic in taste and temperament, with high professional ideals consistently lived up to—gave prominence to his work as teacher, writer, and editor, in each department successfully filling all the requirements, and by his personal influence and example elevating to a higher plane the profession of dentistry.

Dr. D. J. McMillen.

DIED, suddenly, at his home, Kansas City, April 2, 1913, DRURY JOHNSON MCMILLEN, D.D.S., M.D.

Dr. McMillen, son of George W. and Cor-

nelia (Field) McMillen, was born March 28, 1846, in Bracken county, Kentucky. His father was a carpenter. His early education was received in the Williamstown, Ky., schools and at Armstrong and Bennett Academy, at Chillicothe, Mo., whither his family had moved in 1857.

In 1874 he entered the office of Dr. J. W. Greene, at Chillicothe, as a student. Following this he took a course at the Missouri Dental College, from which he was graduated March 7, 1877. The following June he was elected a member of the Missouri State Dental Association, in which he afterward took a prominent part as an essayist and clinician. In 1878–79 and in 1881 he served as second vice-president, in 1882 as first vice-president, and was elected president in 1883. After his graduation he located at Brunswick, Mo. Here he remained nine years, until 1886, when he removed to Kansas City, where he was actively engaged in practice until 1896, when he retired to devote his entire time to college work. He was the leading spirit in the organizing of the Western Dental College in 1890. Soon after its organization he was elected dean and professor of operative dentistry; both positions he held until his death. The success of the school had been largely due to his strong personality and his untiring energy. He was president of the National Association of Dental Faculties, 1898–99; vice-president for the West of the National Dental Association, 1906–07, and honorary member of the Kansas, Nebraska, Texas, Colorado, Oklahoma, and Alabama State Dental Societies. He received the degree of M.D. from the University Medical College in 1894.

Dr. McMillen was a believer in democratic principles, but never was an active participant in political affairs. He was prominently identified with the Christian Church, having served as deacon in that religious society for many years, and was a member of the Sixth and Prospect Christian Church of Kansas City. In fraternal circles he was prominent as a Mason.

Dr. McMillen was married October 6, 1868, to Miss Sallie E. Poindexter. To them were born Frank A., D.D.S.; Harry B., D.D.S.; Mabel and Ruth, and Mrs. D. P. Gribben, all of Kansas City.—*Dental Brief*, June 1913.

JAMES MCMANUS, *Vice-chairman*,
CLINTON W. STRANG, *Secretary*.

The next order of business was the report of the Executive Council, made by Dr. Burkhart, chairman, which was the announcement of the programs of the general session and the various sections for the day.

The next item on the program for the general session was the reading of a paper by Dr. CLYDE DAVIS, Lincoln, Nebr., entitled "Synthetic Porcelain, Using Mallet Force for Introduction." [See page 44.]

The next order of business was the report of the Research Committee, by Dr. H. C. FERRIS, New York, N. Y., chairman. [See page 53.]

The general session then adjourned until Thursday noon.

THURSDAY—Third Session.

The general session was called to order Thursday at 12 o'clock by Dr. T. B. Hartzell, vice-president.

The first order of business was the reading of a paper by Dr. ROSCOE A. DAY, San Francisco, California, entitled, "Orthodontia and Its Relation to Dentistry." [See page 63.]

Army Dental Corps.

Dr. Hartzell then introduced to the audience First Lieutenant ALDEN CARPENTER, official representative of the dental corps of the United States army, who addressed the association as follows:

Mr. President, members and friends of the National Dental Association,—It affords me great pleasure to receive this recognition; furthermore, let me say that the members of the dental corps of the United States army appreciate the consideration you have shown them in granting to them the right to representation in your organization.

I am sorry to state that I am not prepared to entertain you with an interesting paper—which is all due to the fact that our friend Dr. Dewey has been showing me what he has accomplished in research work, and also in orthodontia. This has so impressed me that I feel like giving up general practice and devoting all my time to orthodontia.

The climatic conditions this morning are such that a long-drawn-out paper had better be printed and distributed than read; so I have endeavored to prepare a short syncpsis of what constitutes our corps, and how the work is carried on in the army.

First, the act of Congress approved March 3, 1911, establishing the dental corps of the army:

Hereafter there shall be attached to the medical department of the army a dental corps, which shall be composed of dental surgeons and acting dental surgeons, the total number of which shall not exceed the proportion of one to each thousand of actual enlisted strength of the army. The number of dental surgeons shall not exceed sixty, and the number of acting dental surgeons shall be such as may from time to time be authorized by law. Dental surgeons are commissioned with the rank of first lieutenant, and shall have rank in such corps according to the date of their commission. The pay and allowances of dental surgeons shall be those of first lieutenant, including the right to retirement on account of age or disability as in the case of other officers.

Appointees as acting dental surgeons must be citizens of the United States between twenty-one and twenty-seven years of age, and graduates of standard dental colleges. They shall be required to pass the usual physical examination as required for appointment in the medical corps, and a professional examination which shall include tests of skill in practical dentistry and of proficiency in the usual subjects of a standard dental college course.

Applications for examination should be made to the Surgeon-general of the army, and applicants who qualify at the examinations will be employed on a contract for a period of three years, receiving $150 per month, also traveling allowances in changes of station, quarters, heat and light, also medical treatment in case of sickness.

After a period of three years, acting dental surgeons whose work and conduct give rise to no material and well-grounded criticism will be regarded as eligible for promotion to the grade of dental surgeon, subject to a physical and professional examination by a board duly constituted as prescribed by law. Members of the dental corps are not permanently assigned to any one station, regiment, or arm of the service, but are transferred from station to station as the needs of the service demand. All supplies, instruments, etc., are supplied by the government.

There are now twenty-eight dental surgeons and twenty-three acting dental surgeons in the service. Their field of operation necessitates their visiting all the military posts in the United States, Alaska, Hawaiian Islands, Philippine Islands, Porto Rico, China, and Panama. So you may see, gentlemen, that the young man of active mind who longs for a change of scenery and climate may realize his ambition.

Before closing, I wish to state that I know of no better field for the young professional man than in entering the

United States army. He will there receive a training that will better fit him for his chosen field, and if he shows adaptability in any specialty pertaining to dentistry, his opportunities are many, with a commander ever ready to promote the art and science of dentistry.

The general session then adjourned until Friday at 12 o'clock.

FRIDAY—Fourth Session.

The general session was called to order on Friday at 12 o'clock by the president, Dr. Hetrick.

Panama-Pacific Dental Congress.

Dr. Hetrick introduced Dr. T. Sydney Smith, Palo Alto, Cal., who addressed the association as follows:

Mr. President, and members of the National Dental Association,—I have the honor to come before you in the interests of the Panama-Pacific Dental Congress, and to bring to you greetings from the officers of that congress and the host of willing workers in the Pacific coast states.

It is evident to all that the completion of the Panama Canal is one of the greatest achievements of modern times and marks a new era in the commerce and prosperity, not only of the two Americas, but also of the entire world. It is fitting that this new era of commerce should be celebrated and ushered in by a great International Exposition to bring together the nations of the world at some definite time and place. This Exposition, as you know, will be held in San Francisco, California, in 1915.

It is equally important that we should take advantage of this gathering of the nations to advance the interests of science in general, and that we should not neglect our especial branch, the science of dentistry. Realizing the significance of this, the dentists of the Pacific coast states took the initiative step and organized the Panama-Pacific Dental Congress. Representatives were sent last year to Washington at the time of the National dental convention to secure the co-operation of this great organization. Our gratification can well be imagined when we obtained, not only the unanimous consent of this body to meet with us, but also secured the International Dental Federation. Having secured the co-operation of these two great bodies, it devolved upon us to work out ways and means whereby we could make this, if possible, the greatest congress in the history of dentistry.

To insure the success of this congress we found it necessary to elect permanent officers. The Committee of Organization, in regular session at San Francisco last June, elected the following officers:

Dr. Frank L. Platt, *President.*
Dr. Chas. N. Benbrook, *Vice-president.*
Dr. F. G. Baird, *Treasurer.*
Dr. Arthur M. Flood, *Secretary.*

The Executive Committee consists of the above-named officers, and eleven others who constituted the Committee of Organization. Executive committees, each consisting of a chairman and four others, have been appointed for about forty states and eighteen foreign countries, and the appointments of a number of others are pending. Negotiations are under way with manufacturers and dealers for the purchase of exhibiting

space. Various means and methods for publicity have been put into execution and are awaiting development. Universal enthusiasm prevails throughout the coast states, and the most cheering and encouraging reports and letters are coming in from all over the world. The proposition grows larger with each day.

Subscriptions to our promotion fund have been generous and most satisfactory. So far the following organizations have subscribed:

California State Association	$1500
San Francisco District Society	500
Alameda County Society	500
Southern California Association	1000
Additional private subscriptions to date (from Southern California)	1400
Oregon State Association	250
Portland District Society	300
Utah State Dental Society	150
Odontological Society, Salt Lake	50
Washington State Society	150
Seattle Dental Study Club	100

The total subscriptions to date are nearly $13,000.

It is desired by the committee that the members of the profession generally buy their memberships in the congress at their earliest convenience, so that the committee may, as early as possible, have some idea as to what the ultimate membership will be, as well as creating and establishing a personal interest in the Congress.

The Panama-Pacific Dental Congress will open on Monday Morning, August 30, 1915, and continue in session for ten days, not including Sunday. The congress will meet in the new million-dollar auditorium to be constructed by the Exposition Company as a part of the Civic Center of San Franciso, which will not be an integral part of the Exposition, and not within the grounds. In behalf of the officers of the Panama-Pacific Dental Congress, I most cordially invite you all to attend this great meeting, and to aid us in making it the largest and best ever held.

Motion was made and carried that the invitation to the National Dental Association from the Panama-Pacific Dental Congress presented by Dr. Smith be accepted with thanks.

Installation of Officers.

The next order of business as announced by the President was the installation of the newly elected officers. The following officers were then duly installed:

President—Homer C. Brown, Columbus, Ohio.

First Vice-president—Chas. Channing Allen, Kansas City, Mo.

Second Vice-president—M. L. Rhein, New York City.

Third Vice-president—H. H. Johnson, Macon, Ga.

Treasurer—H. B. McFadden, Philadelphia, Pa.

General Secretary—Otto U. King, Huntington, Ind.

Dr. Brown then introduced to the association Dr. W. S. Zeile of Sydney, Australia, who addressed the association.

Dr. H. J. Burkhart moved that a rising vote of thanks be given to the retiring president, Dr. Hetrick, for his very efficient work in conducting the affairs of the association. [Carried.]

Dr. Burkhart also moved a vote of thanks to the Local Committee of Arrangements, and especially to Dr. Chas. C. Allen, for the splendid work done in making the arrangements for the meeting and for the very efficient manner in which they conducted everything placed in their hands. [Motion carried.]

Motion was then made and carried that the association adjourn until the next annual session—at Rochester, N. Y., July 7, 1914.

EXECUTIVE COUNCIL.

FIRST SESSION.

(Kansas City, Mo., July 8, 1913.)

The Executive Council met at Convention Hall at 9.45 a.m., Dr. H. J. Burkhart presiding and the following members present: Drs. Hetrick, Warner, Hinman, and Brown.

The following resolution with reference to the transition period of the association was presented, and was unanimously recommended to the association for adoption:

Resolved, That, in view of the apparent misunderstanding which exists relative to several matters in connection with the transition from the old to the new constitution, it is the sense of this meeting that the following action should be taken:

1st. That the Officers and Council elected at Washington shall conduct this meeting as under the old constitution, except that the Council will report to the House of Delegates after it is organized instead of to the general body.

2d. That the House of Delegates for this session shall consist of one delegate representing each state society which has voted to affiliate with this association, and that none of such delegates shall hold over for 1914, unless re-elected by their respective societies.

3d. That such House shall hold its first meeting on Wednesday, July 9th at 2.30 p.m. in the White Room in the Baltimore Hotel.

4th. That the House of Delegates shall select the place of meeting and elect the general officers for the ensuing year, also a board of nine Trustees, all of whom shall serve for one year only, and shall transact all other business appertaining to the conduct of the affairs of this association, subsequent to this meeting.

5th. That the new Constitution and By-laws shall be in full force as applied to the 1914 meeting.

6th. That all former members and new members who wish to be credited as members for the current year shall pay $5.00 dues as per statements already sent out by the Treasurer, and that the payment of said dues shall cover membership up to January 1, 1914.

7th. That hereafter the fiscal year of this association shall agree with the calendar year, and dues of one dollar per member for the year 1914 shall be payable January 1, 1914.

8th. That all members of state societies which have voted to affiliate with this association, who are not already members, shall be extended all privileges of membership at this meeting without payment of dues, but will not be entitled to receive the bound volume of Transactions.

Dr. Weston A. Price asked permission to request contribution for the Research Foundation Fund, following his address before the general session, and on motion this request was granted.

On motion Council adjourned to meet at 3 p.m. in Parlor D, Baltimore Hotel.

SECOND SESSION.

The Executive Council was called to order by Chairman Burkhart at 3 p.m. at the Baltimore Hotel. Drs. Hetrick, Smith, Hinman, Warner, and Brown were present. Dr. Brown was excused

in order to prepare the program for the next day.

Dr. ALFRED C. FONES, chairman of the Oral Hygiene Committee presented the following report, which on motion was accepted:

REPORT OF THE COMMITTEE ON ORAL HYGIENE.

Seemingly there has been little accomplished by your committee during the past year, and yet in reality your chairman believes that a work has been started that will be productive of much value in a comparatively short time.

Let us first analyze what we mean by oral hygiene. The simplest definition would be "mouth cleanliness," and I believe that the great majority of dentists are of the opinion that mouth cleanliness means the systematic use of the tooth-brush. In other words, if the dentist advises his patients to be faithful in using their tooth-brushes, he feels that he is an active worker for oral hygiene. Suggestions given this way accomplish but little. Not one in fifty knows how to brush the teeth and gums and to get a thorough cleansing effect as well as a proper stimulation of the blood supply around the roots of the teeth. To make brushing effective the individual must be taught, and a washbowl clinic should be given to patients.

This necessitates first of all that the dentist must know how to brush his own gums and teeth before he can teach others. It is very difficult to teach old dogs new tricks, but let us assume that it is possible to train patients to correctly use the tooth-brush and brush their gums and teeth three or four times daily, is this oral hygiene? Undoubtedly it is a very important part of oral hygiene, but most people are dependent upon the frequent surface treatments of the teeth by the dentist or a trained assistant, if caries is to be properly checked and the gingivæ and peridental membrane kept in a condition of health. There is much that accumulates around the necks of the teeth and on their surfaces that the brush will not remove, and the patient is dependent upon aid for the removal of these deposits. Therefore we believe that the first step to be taken is to awaken an interest and a desire on the part of the dentists to learn how to clean teeth, and how to instruct their patients in the home care of their mouths. Each dentist should be an educational center, with a clean and healthy mouth, so that he may know the blessings of oral hygiene himself, in order to consistently teach it to his patients. A few men cannot hope to do much with one hundred million people regarding clean mouths, and until a goodly share of the forty thousand dentists in the United States will practice cleanliness, we cannot expect to create much impression.

We believe that the next step should be that every state dental examiner should make himself familiar with the principles and practice of prophylaxis, in order that he may intelligently examine applicants for state licenses, and that the examinations in all the states should contain at least five questions on oral prophylaxis; also that each applicant be made to demonstrate his ability to properly perform a surface treatment of the teeth with instruments, and a polishing of their surfaces with hand polishers, using orange-wood sticks and fine pumice.

If half the time now spent by applicants in putting in a gold filling in state examinations was devoted to a surface treatment of the teeth, and the other half to cavity preparation, we would get at the source of future education for the dental profession regarding oral hygiene. When such a system of examination is adopted by state examiners, you may rest assured that the colleges will provide a course on prophylaxis, in order that the students may be fortified for these examinations.

And lastly, we come to the most important work of all, the work of oral hygiene in our public schools. The source of the flood of dental decay and unclean mouths is there, and it is only through the education of the children in our public schools that we can hope to partly stem the flood and bring the blessings of oral hygiene into the next generation.

The chairman of your committee has been quite active for some time past, with the aid of the Bridgeport Dental Society, in trying to secure an educational dental clinic in the public schools in Bridgeport, Conn., and in the latter part of the winter a sum of

five thousand dollars was allowed the board of education by the board of apportionment to start this work. The following note from the board of apportionment accompanied the appropriation:

In making this appropriation the board of apportionment understands the funds are to be expended in prophylactic work for the younger children.

It is the idea and recommendation of the board that the establishment of this work and its conduct and control should be given to a commission of say three qualified citizens, who should serve without pay, and who should be at all times subject to the board of education. This means that said commission should establish its own rules and procedure, and should disburse the funds covered by this appropriation by draft or order approved by the board of education, but that any or all of said commissioners should be removable by the board of education at the discretion of said board without cause being assigned and shown, whenever in the judgment of said board the good discipline and conduct of the public school system of Bridgeport may be required.

On motion of Mr. Hinks, the communication was accepted, recommendation adopted, and the board of education empowered to make appointment in conformity with same.—*Submitted at meeting of February 25, 1913.*

At the present time nothing definite has been done by the board of education. We felt it might be of interest to you to know that a serious attempt was being made to solve in a practical manner the subject of oral hygiene.

We now wish to present a general scope of our plans, as contemplated, in order that you may understand what our intentions are regarding an educational and preventive dental clinic. As the appropriation of five thousand dollars called for a clinic for the relief of pain from toothache of any child too poor to pay for dental service in any of our public schools, as well as a demonstration of what could be done in increasing mental and physical betterment through oral hygiene in one school, our first year's work would have been as follows, as a demonstration:

First of all a central clinic would be established, with a full office equipment. This central clinic would have a licensed practitioner and also a secretary. The work of the dentist, aside from relieving pain, as well as the work of the secretary, aside from keeping such records, will be stated shortly.

As the demonstration would take place in one school, among five or six hundred pupils, four dental nurses were to be trained to give prophylactic or surface treatment of the teeth to each pupil every month. The chairs were to be placed in the school building, and the work of the nurses carried on during school hours.

Each child was to be trained in the use of the tooth-brush, and as this was accomplished, the child would go under inspection every morning and afternoon when arriving at school, to see that his mouth was clean before entering the classroom. Cards would be given to each child passing inspection, and when arriving at their seats their names would be written on the card and the cards collected and given to the nurses to check up later on.

Those children who came with unbrushed teeth would be obliged to go to the tub in the basement, and, securing their own brushes from the rack, clean their teeth before they could secure cards to enter the classroom. Of course the brushing at the school would be accompanied by a demerit except in those exceptional cases where the home conditions would not permit of its practice.

At the start a number of dentists would be asked to aid in making a chart examination of each child's mouth. A properly worded letter, together with a copy of the examination blank, would be sent to the parents of the child by the secretary of the central clinic. It would be our aim to have all those who were able to pay for dental service take their children where they choose and have their mouths put in order. At each monthly treatment of the teeth by the nurses they would note the condition of the child's mouth, and if the dental work had not been done, report to the secretary of the central clinic. The secretary could again call the attention of the parents to the child's teeth, and if after the third month the teeth were still neglected an investigation would be made, and if the facts showed that the parents were too poor to pay for dental service, the dentist at the central clinic would do what he could in filling and treating the conditions found. No doubt it would be impossi-

ble to secure sound teeth with all the children, but the great majority would be stimulated to have the work done by having their mouths made clean and their teeth white and polished by the monthly prophylactic treatments, as well as by the stereopticon lectures which would be given at least once a week by dentists or those who were competent to speak on general hygiene. Of course lectures on food values as well as the proper use of the teeth would be given.

In the fall a lecture course for dental nurses would be started, and as these lectures would be held in the evening twice a week, it was planned to admit a class of thirty, as it would not be any more difficult to talk to thirty than it would be to four. We believed it possible to secure men of high standing and ability to each give from four to six lectures or more during the winter, to aid a cause so worthy and necessary. The lectures were to be taken down in shorthand, and later printed as a working basis for an educational course for dental nurses. These nurses would receive their practical training on manikins before being allowed to work for any children.

No doubt many questions could be asked at once as to the various details, but first let us state what we wish to ultimately accomplish in the schools. If our year's demonstration showed the betterment that we hoped for—and it could hardly help doing so, as thirty-three per cent. of the children in the first five grades of this one school selected are reviewing their grades—we would then try and secure enough of an appropriation to put into practical service Dr. Ottolengui's suggestion, which follows: A year from this September we would place ten dental nurses throughout the schools to take care of the children in the first grade. The following year these ten nurses would follow these children into the second grades, and a new corps of nurses would enter the first grade. This procedure would be repeated each year until the first five grades of all the schools were supplied with dental nurses. This would insure each child proper care of his teeth and an education regarding cleanliness and hygiene for the first five years of his school life, which is the period that the teeth are most susceptible to caries. These nurses, if properly educated for this work, could eventually act as teachers and lecturers on hygiene, and in this way carry the work along successfully without any outside aid.

No doubt to many of you who have given this matter but little thought, the plan as outlined would seem complicated, theoretical, impossible, but we believe that the more you analyze it the more you will become convinced that it is the only practical solution to the great problem of oral hygiene according to our present-day enlightenment.

The source of unclean mouths and decayed teeth is found in the first five grades of our public schools. How are we going to check it?

It usually takes thirty years for any great movement that really has merit to become generally accepted and adopted. Oral hygiene has been under way for half that period. The next fifteen years should see its final appreciation and adoption.

On motion, the president, general secretary and treasurer, elected this year, the Oral Hygiene Committee, and such others as the president may select, were appointed delegates to the Fourth International Congress on School Hygiene, held in Buffalo, August 25–30, 1913. On motion the general secretary was directed to request the presidents of all the state dental societies to name a delegate to that congress.

Dr. C. B. Warner, as a special committee of one, presented the following report with reference to insurance for dentists in malpractice suits:

COMMITTEE ON INSURANCE AGAINST UNJUST MALPRACTICE SUITS.

Mr. President and Members of the Executive Council:

At the last annual meeting a committee, consisting of the undersigned, was appointed to inquire into the matter of legal defense for members of the National Dental Association against unjust malpractice suits. Any of our members, no matter how skilful, is liable some day to make a slip, or meet with an accident, which may place him in the un-

pleasant position of being a defendant in a lawsuit. In many respects this is a severe hardship, for the average dentist is a busy man and has little to do with law courts. Moreover, the damage to the reputation is far greater than the financial loss involved.

So important is this matter that insurance companies are formed to afford the practitioner relief from malicious prosecution of this nature. There is only one difficulty in handling this matter by a private company, which is that the cost of securing business is quite large, thereby making the rate of insurance high. Another point that may be urged is that only a small percentage of our members take out this insurance, and those who do must support the company. What little experience has been had in this matter points overwhelmingly in favor of legal defense being undertaken by associations of dentists. The Massachusetts Dental Society has for one year been protecting its members and not one case has gone to court. The Illinois State Medical has protected its members for five years, in 199 suits, and only lost one case, amounting to $100.

The usual fee for this service for one year is $15.00 as charged by the average insurance company. The Illinois Society above mentioned assesses its members one dollar a year. There is no doubt but that a group can bargain and protect themselves cheaper than can an individual. Our reputation is one of our greatest assets. The logical conclusion, therefore, is that the organization should take steps toward the legal protection of its members. A law committee should be one of the permanent committees of this organization. The committee should be given the necessary time to organize and prepare a successful defense of our members. Such a committee will be deservedly popular with the individual members, since everyone is directly benefited at a very small cost.

C. B. Warner, *Committee.*

On motion a committee of three was appointed to investigate this matter and suggest ways and means, and to report at the next meeting. The following were appointed as such committee: Drs. C. B. Warner, Urbana, Ill.; J. A. Libbey, Pittsburgh, Pa.; Edwin N. Kent, Brookline, Mass.

Dr. C. B. Warner presented the following report as chairman of the Dental Educational Committee, which on motion was adopted and the committee continued:

REPORT OF THE DENTAL EDUCATIONAL COMMITTEE.

Mr. President and Members of the Executive Council:

Never in the history of the dental profession has there been such a widespread interest by the public in things dental as today. This is evidenced by the talk of the people you meet, by the articles that appear in the newspapers and popular magazines, by the interest in public school inspection, and by the establishment of dental officials in our state and national public institutions. Then we notice the activities of the profession itself; with its free lectures, its moving picture films, its scientific research, and its professional literature. The manufacturers of dental toilet preparations are also alive to the times, educating the people in the care of the mouth by more scientific methods, and in the use of more scientific mouth-washes. While your committee cannot claim any honor for this state of affairs, yet it cannot but feel gratified that its work is progressing so well. It has been quietly overlooking the field, and assisting wherever possible. Especially have we been active in the line of promoting articles on the care of the teeth in the various magazines. By so doing we reach a very large class of people, who are in a position to take intelligent care of the mouth and are a class that will disseminate the knowledge obtained. We are still operating the newspaper campaign, thereby reaching the poorer classes of people. This method of interesting the public will ever be one of the best we can use, and at slight cost.

We have endeavored, so far as possible, to keep in touch with the publicity committees in the different states and assisted in their campaigns. In this matter we feel the loss of an official publication that would reach every member. The matter of public

dental education would well fill a department in such a journal. We hope for the speedy establishment of an official organ. By its aid and a sound method of organization, this committee should be in a position to assist any locality with material and suggestions for a campaign of education. The lack of a great medium of communication greatly hampers the work. We have begun a little work in the matter of education which may result in a correction in school books. Most of the school books now used were written some time ago and are not entirely correct. We have hopes that some changes and additions may be made along this line which will make the pupil better, and more correctly informed. We can find no fault with the public in taking an interest in dental affairs. The problem of public dental education is solving itself, and we have the other and more important problem to face: Are we, as dentists, able to meet this enlightened appeal for our services in meritorious work?

C. B. WARNER, *Chairman.*

Dr. C. B. WARNER presented the following report as a special Committee on Crocker Land Expedition, which was accepted, all contributing to its success thanked and the expenses incurred in this connection ordered paid:

COMMITTEE ON CROCKER LAND EXPEDITION.

MR. CHAIRMAN AND MEMBERS OF THE EXECUTIVE COUNCIL:

On the second day of July, a party of scientists, known as the Crocker Land Expedition, left New York harbor for the arctic regions. Crocker Land lies adjacent the North Pole and was seen by Peary on his last trip north. This expedition contemplates spending three years in this region engaged in scientific research. It has the indorsement of Peary and is commanded by Mr. McMillan, who was with Peary. The boat used was the same used by Peary, the "Roosevelt." The sponsors for this expedition are the American Museum of Natural History, the American Geographical Society, and the University of Illinois. Heretofore it has been the rule, in an expedition of this kind, that if a tooth of one of the members gave trouble, either it was extracted, or the member continued to suffer.

It was suggested by some of the members of this expedition that a dental outfit would not come amiss, especially since they were to remain in the North for so long a period. This suggestion was reported to the president and secretary of this association, and was approved by them. The National Dental Association has the honor of being the first dental organization to look after the health, as regards the mouth and teeth, of those engaged in scientific research. By this act we step out of the limited confines of our own line of work and walk shoulder-to-shoulder with other great scientific organizations.

Scientific work of this nature is done through voluntary contributions. The National Dental Association will be given proper credit for its contributions.

The undersigned was appointed by the president to look after the matter, with full power to act. The time in which to act was short, but a suitable equipment was provided at a cost of $133.09. Valuable assistance was rendered by Dr. Geo. E. Hunt and Dr. Geo. McCann. I wish to further call special attention to the aid rendered by the S. S. White Dental Mfg. Co., both by a substantial gift and by their ability in handling the order. The Lee S. Smith & Sons Co. also assisted by a donation. In a letter written just before the start, the leader, Mr. McMillan. writes: "I wish to assure you that the Crocker Land Expedition in general and I in particular wish to thank you for the excellent supply of dental material and equipment which we have obtained through your kindly and generous interest. Our dental equipment is perhaps as complete as any we have, and I am sure that every member of the expedition appreciates your gift. Allow me to thank you for myself and in behalf of the rest of the party."

These men, who are virtually risking their lives in the interest of knowledge, appreciate what we have done for them, and I believe that we will all feel better for this deed.

This equipment, if it shall come back in good shape, will be returned to this association for further good work in free clinics or otherwise. The equipment will be used for

temporary work by the physician, and he has received the proper instruction for its use.

Respectfully submitted,
C. B. WARNER, *Committee.*

Dr. T. SYDNEY SMITH addressed the Council relative to the Panama-Pacific Dental Congress. Dr. Smith was also granted permission to present this question before one of the meetings of the general session.

Dr. EUGENE R. WARNER offered the following resolution, which was unanimously adopted:

RESOLVED, That the Executive Council has received the report of the representative of the Panama-Pacific Dental Congress (Dr. T. Sydney Smith) relative to the present status of the affairs of the congress in August 1915. and recommend to the House of Delegates that in their consideration of further disposition of the funds of this association, and especially in view of the fact that the expense of the National Association will be materially lessened for the year 1915, due consideration should be given them financially, as well as morally.

On motion of Dr. HINMAN, the secretary was instructed to send notices to the dental journals in the United States that a certain number of copies of the N. D. A. Transactions are in possession of Dr. Arthur R. Melendy, and that these copies may be secured by libraries and other educational institutions and by members of the National Dental Association. Requests for them should be directed to Dr. Arthur R. Melendy, Holston National Bank Building, Knoxville, Tenn., and should be accompanied by thirty cents in postage to defray expense of mailing.

Dr. WESTON A. PRICE addressed Council relative to Scientific Research Fund, and presented a report, which on motion was received, approved, and referred to the House of Delegates. [See page 30.]

Dr. HOMER C. BROWN presented the following report of the Publication Committee, which on motion was received and approved:

REPORT OF PUBLICATION COMMITTEE.

TO THE OFFICERS AND MEMBERS OF THE NATIONAL DENTAL ASSOCIATION:

Your Publication Committee advises that the 1912 proceedings were mailed to our members recently, which is, therefore, the report of our committee. We incorporated in the "Minutes of the Executive Council" some correspondence with the Secretary of Agriculture (to be found on pages 25 and 26 of the Transactions), which is in accordance with instructions.

Respectfully submitted,
HOMER C. BROWN, *Chairman,*
W. A. BRIERLEY,
A. O. ROSS.

Dr. HOMER C. BROWN presented the following report as chairman of the Committee on State and Local Societies, which on motion was received, recommendation approved, and report ordered printed in the Transactions:

COMMITTEE ON STATE AND LOCAL SOCIETIES.

TO THE OFFICERS AND MEMBERS OF THE NATIONAL DENTAL ASSOCIATION:

Your Committee on State and Local Societies beg to report that the work of the year has been largely that of co-operation with the Reorganization Committee to the end that the various state societies might take favorable action with reference to becoming constituent societies of the National.

The misunderstanding with reference to the time that the new Constitution and By-laws goes into effect is responsible for our committee not being more active than it has been, but it is thought that our members have quite generally done what they could to bring about the co-operation of the various state dental societies. We recommend that this commit-

tee be continued until at least most of the state societies not yet affiliated become component societies of the National.

Respectfully submitted,

HOMER C. BROWN, *Chairman.*

The Secretary presented the report received from Dr. James McManus, vice-chairman of the Necrology Committee, which report on motion was received, and ordered read at one of the general sessions and printed in the proceedings. [See report of general sessions, page 11.]

DENTAL EDUCATIONAL COUNCIL OF AMERICA.

The Secretary read the following letter and financial report of Dr. Henry L. Banzhaf, secretary-treasurer of the Dental Educational Council of America. On motion both were received, the recommendation approved, and letter and report ordered printed in the Transactions:

KANSAS CITY, MO., July 7, 1913.

DR. HOMER C. BROWN, *Rec. Sec'y, N. D. A.:*

Dear Doctor,—Inclosed herewith I hand you statement showing the finanical condition of the Dental Educational Council of America, which is self-explanatory.

The annual meeting of the Council will be held on Tuesday evening, July 8th, in the Hotel Baltimore, official notice of which has been sent to all members of the Council.

As secretary of the Council, I respectfully recommend that your association return to the Educational Council for the ensuing year a committee of five members as heretofore, with full power to represent the National Dental Association in the Dental Educational Council of America.

The Secretary's annual report will be presented to the Council for its consideration at the annual meeting above referred to, and will be in the nature of a brief survey of the dental educational situation of the United States, based on information we have obtained during the past year.

Should your association or your Executive Council desire further information, I shall be pleased to be at your service.

Sincerely yours,

HENRY L. BANZHAF, *Sec'y-Treas.*

STATEMENT OF THE FINANCIAL CONDITION OF THE DENTAL EDUCATIONAL COUNCIL OF AMERICA.

(August 21, 1912, to July 1, 1913.)

Receipts.

Aug. 21, 1912.	Cash on hand	$481.95
	3 per cent. int. to date	14.45
Jan. 17, 1913.	Rec. from Dr. Broadbent, N. A. D. E...	75.00
	Total receipts ..	$571.40

Disbursements—as per vouchers.

Sept. 17, 1912.	L. D. Telephone to Pruyn	$1.80
Dec. 9, 1912.	Abbie A. Brown, stenog.	6.20
Jan. 1, 1913.	Radtke Bros., printers	18.00
Jan. 1, 1913.	Radtke Bros., printers	1.75
July 1, 1913.	Total postage	6.57
July 1, 1913.	R. Jennings, stenog. and clerical, for past year	24.50
	Total disbursements	$58.82

Total receipts	$571.40
" disbursements	58.82
Cash on hand July 1, 1913..	$512.58
Due from the N. A. D. E. ..	126.40
Total	$638.98

Respectfully submitted,

HENRY L. BANZHAF, *Sec'y-Treas.*

On motion adjourned.

THIRD SESSION.

(JULY 9, 1913.)

Executive Council called to order by Chairman Burkhart at 9.30 A.M. Drs. Burkhart, Hetrick, Smith, Warner, Hinman, and Brown present.

Lieut. ALDEN CARPENTER, of the dental corps of the U. S. Army, addressed the Council as a representative of the army medical department. Dr. Carpenter made some suggestions, and was directed to confer with the Legislative Committee.

Dr. Frank O. Hetrick presented the report of Dr. JAMES TRUMAN, as chairman of the special committee to solicit funds to reimburse Dr. Wms. Donnally for services rendered in connection with dental legislation. On motion the report was received and the committee directed to pay the funds collected to Dr. Wms. Donnally, and that the remainder of the report be referred to the Committee on History with instructions to report next year.

Dr. EDWARD S. GAYLORD presented the report on the President's Address, which was approved, and the chairman directed to read same at the general session Wednesday, also to present same to the House of Delegates. [See general sessions, p. 5.]

REPORT OF PHARMACOPŒIAL COMMITTEE.

Dr. M. F. FINLEY, chairman, presented the following report of the Pharmacopœial Committee, which on motion was received, and recommendation approved, and the report ordered printed:

July 8, 1913.

TO THE OFFICERS AND MEMBERS OF THE NATIONAL DENTAL ASSOCIATION:

Your Committee on Pharmacopœia present no detailed report this year, but feel assured that another year a further report can be secured from Dr. L. F. Kebler, chief Drug division, bureau of Chemistry, United States Department of Agriculture, supplementing and extending the results he gave in his address before this association at the meeting in 1912 in Washington. Therefore we recommend that a committee be appointed to continue the work.

Respectfully submitted,

M. F. FINLEY, *Chairman.*

REPORT OF COMMITTEE ON PUBLIC HEALTH.

Dr. M. F. FINLEY, chairman, presented the following report of the Committee on Public Health, which on motion was received, recommendations approved, and the report ordered printed.

WASHINGTON, D. C., July 5, 1913.

TO THE OFFICERS AND MEMBERS OF THE NATIONAL DENTAL ASSOCIATION:

Your Committee on Public Health begs leave to report that no definite work has been accomplished, although close touch with the situation has been maintained.

The United States House of Representatives refused to appoint a committee to which the subject would belong, because of the sentiment of its members against a Public Health department and therefore it looks unlikely that any hearings would be granted or a report to the House be permitted. The present seems inopportune for action, but your committee would recommend the continuance of a committee on this subject, so as to keep a close watch of anything proposed along these lines and be prepared to protect the interests of the dental profession in case any legislation becomes probable.

Respectfully submitted,

M. F. FINLEY, *Chairman,*
WMS. DONNALLY, *Sec'y.*

Dr. M. F. FINLEY, secretary of the Dental Museum and Library Committee, presented the following report, which on motion was received, recommendations approved, and report ordered printed:

REPORT OF THE COMMITTEE ON DENTAL MUSEUM AND LIBRARY.

July 8, 1913.

TO THE OFFICERS AND MEMBERS OF THE NATIONAL DENTAL ASSOCIATION:

Your committee on Dental Museum and Library offer no specific or definite report

further than to say that the management of this museum and library is so efficiently administered by the U. S. Army officials in charge that the best interests of our profession are being preserved in the records there kept.

Especially do we wish to offer our meed of praise and appreciation of the efforts of Dr. D. S. Lamb, assistant curator, who has taken such an interest in our branch of medicine as to seek out specimens, from the many which are constantly coming to this great institution, both of comparative and human anatomy, which would help out the collection in displaying the many points desired.

Every dentist ought to bear in mind that any specimen, anatomical, pathological, or mechanical, of present or future interest to the profession, will be received, duly credited to the donor, properly labeled, and preserved for present and future reference in this, the only National dental collection in America.

Your committee, especially the members residing in Washington, D. C., offer their services as escort to all visiting dentists who desire to see these collections, and have to report that it has been their pleasure in the past and very recently to so escort many members of our profession through this institution. We recommend the continuance of such a committee.

Respectfully submitted,

GEO. W. BOYNTON, *Chairman*,
M. F. FINLEY, *Sec'y*.

The Secretary read a telegram from Dr. W. G. Ebersole calling attention to the Fourth International Congress on School Hygiene. On motion it was received and directed to be read before the general session.

On motion the Secretary was directed to send a letter to Governor Wm. Sulzer, commending him for his reappointment of Dr. Eugene H. Porter as Health Commissioner of the state of New York.

On motion a committee of three, to be appointed by the President, was directed to send a letter to Governor James M. Cox commending him for appointing Dr. Homer C. Brown as a member of the Ohio State Board of Health. The following were appointed: Drs. L. D. Mitchell, L. L. Barber, and W. A. White.

On motion adjourned to meet at 2 P.M. to review the credentials of the delegates from the various states in the House of Delegates.

FOURTH SESSION.

The Executive Council was called to order at 2 P.M. by Chairman Burkhart, with Drs. Burkhart, Hetrick, Smith, Warner, Hinman, and Brown present.

Dr. BURTON LEE THORPE, secretary F. D. I. delegates, presented the following report, which on motion was approved:

TO THE EXECUTIVE COUNCIL:

The committee appointed by the National Dental Association having in charge the program for the Sixth International Dental Congress, London, Eng., August 3 to 8, 1914, today have elected the following:

HONORARY PRESIDENTS OF SECTIONS.

I. *Dental Anatomy, Histology, and Physiology.* Dr. M. H. Cryer, Philadelphia, Pa.

II. *Dental Pathology and Bacteriology.* Dr. Thos. B. Hartzell, Minneapolis, Minn.

III. *Dental Surgery and Therapeutics.* Dr. Edward S. Gaylord, New Haven, Conn.

IV. *Dental Physics, Radiography, and Metallurgy.* Dr. J. P. Buckley, Chicago, Ill.

V. *Dental Prosthesis.* Dr. D. O. M. LeCron, St. Louis, Mo.

VI. *Orthodontics.* Dr. Roscoe A. Day, San Francisco, Cal.

VII. *Oral Surgery and Surgical Prosthesis.* Dr. J. D. Patterson, Kansas City, Mo.

VIII. *Anesthesia, General and Local.* Dr. Thos. P. Hinman, Atlanta, Ga.

IX. *Oral Hygiene, Public Instruction and Public Dental Services.* Dr. Herbert L. Wheeler, New York, N. Y.

X. *Dental Education.* Dr. Henry W. Morgan, Nashville, Tenn.

Essayist on the first day of the congress—Dr. EDWARD C. KIRK, Philadelphia, Pa. *To*

deliver the address representing the N. D. A. at the opening of the congress—Dr. H. J. Burkhart, Batavia, N. Y.

Truman W. Brophy, *Chairman*,
S. H. Guilford,
Waldo E. Boardman,
William Carr (per Wheeler),
Burton Lee Thorpe, *Sec'y*.

The Secretary presented the following list of accredited delegates, which on motion was adopted as a temporary roll of the House of Delegates:

Alabama—H. Clay Hassell.
Arkansas—I. M. Sternberg.
California—T. Sydney Smith.
Southern California—C. C. Noble.
Colorado—H. F. Hoffman.
Connecticut—Edward S. Gaylord.
District of Columbia—M. F. Finley.
Florida—J. W. Simpson.
Georgia—William Crenshaw.
Illinois—Arthur D. Black.
Indiana—Otto U. King.
Iowa—R. H. Volland.
Kansas—L. D. Mitchell.
Kentucky—H. B. Tileston.
Louisiana—Wallace Wood.
Maryland—B. Holly Smith.
Massachusetts—Waldo E. Boardman.
Michigan—Marcus L. Ward.
Minnesota—F. J. Yerkes.
Mississippi—H. D. Chipps.
Missouri—F. M. Fulkerson.
Nebraska—E. H. Bruening.
New Mexico—Charles A. Eller.
New York—R. Ottolengui.
National Capital—Emory A. Bryant.
Ohio—L. L. Barber.
Oklahoma—B. L. Shobe.
Oregon—Frank C. Pearn.
Pennsylvania—Howard S. Seip.
Tennessee—H. A. Holder.
Texas—Guy Morgan.
Utah—A. C. Wherry.
Washington—T. M. Barlow.
Wisconsin—E. A. Geilfuss.
U. S. A. Dental Corps—Alden Carpenter.

REPORT OF THE PATENT COMMITTEE.

Dr. Emory A. Bryant, Chairman, presented the following report of the Patent Committee, which on motion was received, recommendation approved, and referred to the House of Delegates:

To the Officers and Members of the National Dental Association:

The Committee on Patents, through its chairman, begs leave to report progress, and in view of the change in the administration of the United States government and Congress, it is advisable to await the regular session of Congress before introducing a new measure relating to patent legislation. The committee also desires to be discharged from further duty, and that a new committee be appointed.

Emory A. Bryant, *Chairman*.

On motion adjourned.

FIFTH SESSION.

(July 10th, 9.30 a.m.)

The Executive Council was called to order at 9.30 a.m. July 10th, by Chairman Burkhart. Drs. Burkhart, Hetrick, Warner, Hinman, and Brown were present.

REPORT OF THE JOURNAL COMMITTEE.

Dr. Herbert L. Wheeler presented the following Journal Committee report, which on motion was postponed for later consideration:

To the Executive Council of the National Dental Association:

The Journal Committee respectfully submits the following report: Owing to insufficient funds at present, no active steps could be taken toward putting forth a journal by the association.

The fund started in the National Dental Association has to its credit about $1500. This will not be added to during the process of reorganization, but the committee believes that in case of need it can procure funds.

We recommend that a committee be continued and directed to submit some definite report at the next meeting.

Herbert L. Wheeler, *Chairman*,
Burton Lee Thorpe, *Sec'y*.

REPORT OF THE MILLER MEMORIAL FUND COMMITTEE.

Dr. TRUMAN W. BROPHY made the following report for the Miller Memorial Committee, which on motion was approved and ordered printed, and the committee continued:

TO THE NATIONAL DENTAL ASSOCIATION:

Your Committee on the International Miller Memorial Fund begs to report that at the time of the meeting of the International Dental Federation in August of 1912, a total of $4264 had been collected from the United States and paid to the treasurer of the International committee.

Since that time no funds have been received except a check for $31 from the Oklahoma State Dental Society, which they requested we should hold without entering, as they expect to increase it to $50.

Respectfully submitted,

TRUMAN W. BROPHY, *Chairman*,
B. HOLLY SMITH,
Miller Memorial Committee.

Dr. J. V. CONZETT addressed the Council relative to the National Dental Association paying $150 of the expenses of the union Oral Hygiene meeting held in Washington last year, together with a portion of the expenses incurred in the Oral Hygiene exhibit in connection with the Fifteenth International Congress on Hygiene and Demography. Further explanation was made by the Secretary, and on motion the Secretary was directed to draw an order in favor of Dr. W. Smith Frankland for $150 whenever the funds would justify same.

Dr. EDWARD S. GAYLORD made verbal report for the Relief Committee, and asked permission to make further report and that the committee be continued and Dr. James McManus added thereto. On motion the request was granted. The following report was later submitted:

REPORT OF THE NATIONAL RELIEF FUND COMMITTEE.

Since making our last report in 1912, your committee have adopted the suggestion coming from many parts of the country that we appeal to the profession for voluntary contributions.

We distributed about four thousand letters throughout the United States, mailing them first to members of the National Dental Association; then from selected lists and "Polk's Directory" to those gentlemen indicated as being members of state societies. We also published this letter in the various dental journals, and we desire here to return thanks to the editors who were so kind as to make editorial reference to this appeal and to commend it to their readers.

It will be noted that we appeal to the state societies, where they can see the wisdom of doing so, to carry out the original plan and pass the measure of setting aside $1 per member for this fund.

As far as our information goes, Tennessee and Colorado are the only states that have passed this act up to this time. Your committee has conducted this work of printing, mailing, and corresponding at its own personal expense, and it has been the policy of your committee to ask that all checks be made payable to our treasurer, Dr. H. B. McFadden.

While the tangible evidence in response to our effort is not as great as we hoped, we attribute the apparent apathy to the distracting influence during the year, relative to necessary vital changes in our state and national bodies under reorganization. However, we enter upon the work this year with a spirit and plan which we feel confident will be received with such favor as to materially increase the interest of our members in a fund which shall be available as insurance in the event of misfortune.

Respectfully submitted,

L. G. NOEL, *Chairman*,
E. S. GAYLORD,
W. T. CHAMBERS.

Dr. CHARLES W. RODGERS presented a letter from Dr. Charles S. Butler, relative to some booklets printed by the association a few years ago, and on mo-

REPORT OF THE TREASURER.

RECEIPTS.

Balance on last settlement, August 31, 1912	$952.04	
Received from dues to July 1, 1913	2,945.00	
" " " Southern Branch	439.00	
Contribution from Southern Branch	150.00	
Maryland State Dental Society, dues 1912	155.00	
		$4,641.04

DISBURSEMENTS.

1912.			
Sept. 14.	Treasurer, salary and expenses	$257.60	
	Willard Hotel—complimentary dinner Drs. Wiley and Kebler	40.00	
	Chas. W. Rodgers, exp. Cor. Sec'y and Legislative Com.	59.80	
	Byron W. Adams, printing bill	24.00	
	A. O. Ross, Clinic Committee	2.85	
	F. O. Hetrick, Section II	23.00	
	H. C. Brown, Rec. Sec'y, salary and expenses	554.55	
" 16.	New Franklin Printing Co.	654.55	
	Clarence J. Grieves, ch., exp. Clinic Com.	406.50	
	H. C. Brown, sec'y Reorganization Com. ..	181.50	
	A. C. Bradley Co., silver band on gavel for President	3.00	
	A. R. Melendy, Pres., exp. acct. 1912 ...	73.47	
	A. P. Burkhart, exp. Clinic Com. 1910–12	6.30	
	Carried forward	$2,287.12	$4,641.04
	Brought forward	$2,287.12	$4,641.04
Sept. 16.	J. D. Patterson, ch., Reorganization Com.	8.00	
	W. R. Clack, exp. Clinic Com.	14.00	
	Henry C. Ferris, ch., Scient. Research Com.	62.20	
Oct. 21.	American Bonding Co., Treasurer's bond..	20.00	
" 29.	Waldo E. Boardman, acct. Oral Hygiene Com.	3.50	
	J. V. Conzett, acct. Oral Hygiene Com. ..	7.00	
	S. W. Foster, " " " " ..	52.00	
	B. Holly Smith, " " " " ..	32.50	
	Wm. Crenshaw, ch., Legislative Com.	57.00	
Nov. 12.	W. G. Ebersole, ch., Oral Hygiene Com. ..	129.90	
Dec. 12.	Wms. Donnally, exp. Legislative Com. ...	200.00	
1913.			
Apr. 13.	H. C. Brown, stenogr. Sept. 20–Mar. 15 ..	230.00	
" 21.	To reimburse National Relief Fund—order of Council	250.00	
June 28.	H. C. Brown, stenogr. Mar. 15–June 21 ..	154.00	
			$3,507.22
	Balance in General Fund, July 1, 1913		$1,133.82
	National Relief Fund (California) July 1, 1913 ..		$4,922.00
	Journal Fund, with int., July 1, 1913		$1,483.20
	National Relief Fund, July 1, 1913		$167.00

Approved by Auditing Committee:

VICTOR H. JACKSON, *Chairman,*
VICTOR S. JONES,
MARK F. FINLEY.

Respectfully submitted,

H. B. MCFADDEN, *Treasurer.*

tion the matter was referred to Drs. Charles W. Rodgers and J. D. Patterson, with instructions to investigate and make recommendation regarding payment on account.

Dr. Charles W. Rodgers presented a report for the Legislative Committee, which on motion was referred to the House of Delegates. [See page 33.]

Dr. H. B. McFadden, Treasurer, presented his report [see opposite page], which on motion was received and referred to the Auditing Committee.

On motion the Secretary was directed to draw orders for the payment of all bills which have been approved by the Auditing Committee of the Executive Committee.

On motion adjourned to 8 p.m.

SIXTH SESSION.

The Council was called to order at 8 p.m. by Dr. H. J. Burkhart, chairman.

The question of the publication of the Proceedings for 1913 was taken up.

Dr. Herbert L. Wheeler presented a proposition from the *Journal of Allied Societies*. After some informal discussion the Secretary called attention to the fact that under the new constitution and action previously taken by the House of Delegates that this was a matter for the Board of Trustees.

The Secretary presented the third annual report of the Educational Council of America just received from Dr. Henry L. Banzhaf, secretary-treasurer. On motion the report was received and filed for reference, but not publication.

Dr. Wm. Crenshaw presented the bill of expenses for the Legislative Committee for $391.50 and called attention to the fact that $150.00 of this amount was a balance due Dr. Donnally for 1912. The Secretary explained that the Executive Council had paid Dr. Donnally $200, all that Dr. Crenshaw had requested, at the Washington meeting, and stated that he understood this amount to be in full to that date.

The Chairman stated that the bill would be received, with instructions to pay it when approved by the Auditing Committee and when funds would permit.

The Secretary read a letter of resignation from Dr. M. C. Smith, Lynn, Mass.

The Chairman stated that if there were no objections, the resignation would be accepted. It was so ordered.

On motion, the final meeting of the Executive Council adjourned.

Homer C. Brown, *Recording Sec'y.*

HOUSE OF DELEGATES.

FIRST SESSION.

(July 9th, 2.30 p.m.)

The first session of the House of Delegates was called to order by President Hetrick at 2.30 p.m., July 9th.

The Secretary read the list of delegates as approved by the Executive Council [see page 26] as a temporary roll-call of delegates. All were present.

The question was raised with reference to two delegates each from California and the District of Columbia, and on motion these were accepted. On motion of Dr. Ottolengui, the entire list of delegates selected by the various states were made eligible to committee appointment.

On motion of Dr. Black, the President was directed to appoint a Committee on Bookkeeping and Records.

Dr. Black presented a number of amendments to the Constitution and By-Laws, to be acted upon at the next session of the House of Delegates. (See minutes of July 10th.)

Dr. Ottolengui presented an amendment to be acted upon at the next session. (See minutes of July 10th.)

Dr. Ottolengui offered the following resolution relative to election of trustees, which was seconded and carried:

Resolved, That the House of Delegates shall at the present session of 1913 elect nine Trustees, who shall serve for one year, and they shall be eligible to re-election at the session of 1914.

Resolved, That the House of Delegates shall, at the session of 1914, elect nine Trustees, three of whom shall serve for one year, three for two years, and three for three years. The Trustees after their election shall by lot determine the period they shall serve.

Resolved, That after the year 1914 there shall be elected annually three Trustees, each to serve for a period of three years, and any vacancy that may occur for an unexpired term shall be filled by election.

REPORT OF COMMITTEE ON SCIENTIFIC FOUNDATION FUND.

Dr. Weston A. Price addressed the House of Delegates relative to the Scientific Foundation and Research Fund Committee, and presented the following report, which had been previously approved by the Executive Council:

The Scientific Foundation Fund Committee hereby recommends that the Executive Council of the National Dental Association recommend to the House of Delegates, which meets under the new constitution at 2.30 p.m., Wednesday, July 9, 1913, that they organize the department of the Scientific Foundation Fund so adequately that the work of that department can be successfully and comprehensively prosecuted.

Weston A. Price, *Chairman*,
A. R. Melendy.

On motion the report and recommendations were unanimously adopted.

Dr. Barber presented the amendments proposed by Dr. Price creating a Scientific Foundation and Research Commission, to be acted upon at the next session of the House. (See minutes July 10th.)

The Report on the President's Address was read by Dr. H. J. BURKHART, and on motion was adopted. [See page 5.]

The Secretary read the report on Patent Committee [see page 26], which on motion was adopted.

On motion adjourned to meet at 9.30 A.M. Thursday, July 10th.

SECOND SESSION.

(JULY 10TH, 9.30 A.M.)

The House of Delegates was called to order at 9.30 A.M. by President Hetrick, with thirty-four delegates present.

Dr. A. D. BLACK presented and read the following amendments to the Constitution and By-laws:

First: A series of amendments which provide for a State Society Officers' Section.

To Article VI of the Constitution, add a new section, to be numbered "3," as follows:

"SEC. 3. There shall be also a State Society Officers' Section, composed of the presidents, vice-presidents, secretaries, and treasurers of the constituent societies. All members of this section shall retain their active membership for one year after their official connection with their respective societies, and shall thereafter be honorary members of this section. All past presidents of state societies shall be honorary members of this section."

On motion adopted.

To Chapter XIII, Section 1, of the By-laws add the following:

"The State Society Officers' Section shall hold its first meeting at 2.00 P.M. on the first day of the annual session."

In Chapter XIII, in Sections 2, 5, and 6, the words "except the State Society Officers' Section" shall follow the words "each section."

On motion these amendments were unanimously adopted.

Add to Article XII, Section 1, of the Constitution, after the word "dollar," the words "payable January 1st for the ensuing year."

Amendment unanimously adopted.

Dr. BLACK offered the following as substitutes for Sections 1 and 2, Article VII:

"SEC. 1. The House of Delegates shall elect the officers and three members of the Board of Trustees as the first order of business after reading the minutes on the afternoon of the third day of the annual session. The officers shall serve for one year. Three members of the Board of Trustees elected each year shall serve for three years."

"SEC. 2. The first ballot for each officer and for the members of the Board of Trustees shall be informal and for the purpose of nominating. After the first ballot, any nominee for office receiving the majority of the votes cast shall be declared elected. In case no nominee receives a majority, the nominees receiving the lowest on each ballot shall be dropped. After the nominating ballot, the three nominees for members of the Board of Trustees who receive the highest number of votes shall be declared elected."

After considerable discussion by Drs. Black, Hetrick, Brown, Morgan, Burkhart, Ottolengui, and Ward, and on motion of Dr. Ottolengui, seconded by Dr. Ward, the amendments to both sections were laid on the table.

Dr. BLACK next presented an amendment to follow the word "association" in Section 1 of Article XI of the Constitution:

"Appropriations for other than ordinary expenses of the association shall have the approval of a majority of the House of Delegates."

On motion the amendment was unanimously adopted.

Dr. BLACK presented an amendment to Chapter IX, Section 1, of the By-laws, which adds, "from its own members" following the words "recording secretary." (On motion this amendment was adopted.)

Dr. BLACK presented the following notice and resolution in connection with Article XIII of the Constitution, relative to amendments for 1914 meeting:

Notice is hereby given that such amendments as may be found desirable to be presented to all members of the 1914 House of Delegates may be presented without the regular notice of said session.

RESOLVED, That the above notice of proposed amendments of the Constitution complies sufficiently with Article XIII, and that such amendments may be adopted at the 1914 session by a two-thirds vote.

Dr. BLACK also offered the following resolution, which on motion was unanimously adopted:

RESOLVED, That the Board of Trustees shall arrange for the time of the meeting of the various scientific sections at the 1914 meeting.

Dr. OTTOLENGUI offered an amendment to Article IX of the Constitution, which proposed substituting "two-thirds" for "unanimous"—so that the Board of Trustees can change the date or place of meeting by a "two-thirds" vote. (On motion the amendment was adopted.)

Dr. OTTOLENGUI called attention to Section 1, Chapter VII, of the By-laws, as to nominations for treasurer, and, there being no Trustees to nominate persons for that office, moved that unanimous consent be granted for the election this year of a treasurer in the same manner as the other officers. (Unanimously carried.)

Dr. BARBER offered the following amendments to the Constitution and By-laws, adding a new article to the Constitution, to be known as Article VII; also a new chapter to the By-laws, to be known as Chapter X:

ARTICLE VII.—SCIENTIFIC FOUNDATION AND RESEARCH COMMISSION.

The association shall organize and maintain a Scientific Foundation and Research Commission of twenty-five members, who shall be elected by the Board of Trustees.

CHAPTER X.—SCIENTIFIC FOUNDATION AND RESEARCH COMMISSION.

SECTION 1. This commission shall consist of twenty-five members, who shall be elected by the Board of Trustees, not more than two of whom shall be from any one state. In addition to the twenty-five members elected by the Board of Trustees, the president and general secretary shall be *ex-officio* members. They shall serve for five years, except that of the first commission five shall serve for one year, five for two years, five for three years, five for four years and five for five years, as shall be designated when they are elected. They shall meet annually at the time of the meeting of the National Dental Association and at such other times as shall be designated by their executive board.

SEC. 2. The duties of the commission shall be to raise funds for carrying on exhaustive dental and oral research, to disseminate scientific knowledge, to support, establish, and encourage research, and such other duties as shall pertain to the furthering of this cause. They shall select from their number an Executive Board of five members, which shall, when the commission is not in session and has not given specific directions, have general control of the administration of the affairs of the commission and general supervision of all arrangements for administration, research, and other matters undertaken or promoted by the commission. They shall organize and incorporate a corporation to be known as the National Dental Research Foundation and Institute, or such other name as the commission shall select, which corporation shall receive, invest and disburse all the moneys provided by the commission and by themselves. They shall organize this corporation in accordance with the laws and requirements controlling such institutions, except that not less than one-third of the trustees of said corporation shall be provided by the National Dental Association. This corporation shall seek bequests, endowments, fellowships, and such other contributions as shall perfect the purpose and plan of the National Dental Association. They shall make a written annual report to the commission and to the National Dental Association.

On motion these amendments were unanimously adopted.

The President announced that the next order of business would be the selection of the place and date of meeting and the election of the general officers and nine Trustees for the 1914 meeting.

Rochester, N. Y., July 14 to 17, 1914,

was unanimously selected as place and date of next meeting. [Later, and in accordance with provision of Article IX of the Constitution, the Board of Trustees changed date to July 7th to 10th.]

Election of Officers and Trustees.

The following were elected:

President—Homer C. Brown, Columbus, Ohio.

First Vice-president—Chas. Channing Allen, Kansas City, Mo.

Second Vice-president—M. L. Rhein, New York City.

Third Vice-president—H. H. Johnson, Macon, Ga.

General Secretary—Otto U. King, Huntington, Ind.

Treasurer—H. B. McFadden, Philadelphia, Pa.

Trustees—H. J. Burkhart, Batavia, N. Y.; Thomas P. Hinman, Atlanta, Ga.; J. P. Buckley, Chicago, Ill.; Thomas B. Hartzell, Minneapolis, Minn.; Eugene R. Warner, Denver, Colo.; Clarence J. Grieves, Baltimore, Md.; Arthur R. Melendy, Knoxville, Tenn.; Frank L. Platt, San Francisco, Cal.; C. L. White, Oklahoma City, Okla.

On motion of Dr. Black, seconded by Dr. Ottolengui, the incoming President was empowered to appoint his committees at his convenience.

The President called for any other business.

Dr. Bryant discussed the report of the Legislative Committee, especially the resolution incorporated at the close of this report, and stated: I am going to offer a little resolution here as an amendment to that resolution, to amend the resolution commending the appointment of specified dental surgeons as a part of the report of the Committee on Legislation, as follows:

Provided, That nothing in this resolution shall in any manner be construed to prejudice any member or members of the present Navy Dental Corps.

Dr. Ottolengui seconded the resolution.

The President stated that the Dental Legislative Committee had made their report to the Executive Council and referred to the House of Delegates, and that if there were no objections this amendment would be filed with their report and considered by the house when their report is taken up.

Dr. Bryant asked that it be taken up at this time. After this matter was discussed by the President and Drs. Bryant and Crenshaw, the President stated: If there are no objections this report will be taken up at this time, but there will not be ample time before adjournment to discuss this to any great length.

The President called upon Dr. Chas. W. Rodgers to read the report of the Army and Navy Legislative Committee, as follows:

REPORT ON ARMY AND NAVY DENTAL LEGISLATION.

To the Officers and Members of the National Dental Association:

Your committee has the pleasure of again reporting more advanced legislation. We were fortunate in having the Naval Appropriation Bill amended in 1913 as in 1912, though the conditions were unfavorable in both instances. The chief features of the dental amendment of 1913 are—

(1) The creation of a Dental Reserve Corps, which was sought in 1912 and desired for many years, which shall differ in no respect from the Medical Reserve Corps, except that the qualification clause shall be extended to include D.D.S.

(2) A provision whereby the dental reserve corps may be utilized as a provisional corps of more experienced men while awaiting the selection of the best

available young men for permanent service in the regular corps.

(3) A provision which prescribes that no dental surgeon shall render service, except temporary service, until his nomination shall have been confirmed by the Senate.

(4) That dental corps appointments of permanent tenure shall be made from the membership of the dental reserve corps as in the case of medical corps appointments from the medical reserve corps;—this includes a term of preparation at the Naval Medical School in Washington.

These features should be regarded as of exceeding importance, more especially as the administration of the law of 1912 might easily result in the selection of men by methods so questionable as to prohibit the idea of impartial sympathies and a kindly disposition to cooperate with the dental profession in its efforts to obtain the most worthy of its better-educated young graduates to represent it in the naval service. Announcements of impartial competitive examinations through the dental journals and the dental colleges and societies would reassure the profession of its opportunity to show its vital interest and its friendly disposition toward the object of securing to the service those best equipped by education and high professional character to meet the dental needs of the navy *personnel* and the economic interests of the government.

Another and material advantage intended by Congress to be more certainly accomplished by the new law than the law of 1912, namely, the emphasis it gives to the method of compelling the scrutiny of the Secretary before appointing, and of the Senate before confirming, will doubtless give the profession a proper and highly useful influence in regard to the passing on the qualifications so essential to the welfare of the profession as well as to the further advancement of the status of the dental service. In any event, these means and opportunities of scrutinizing the fitness of appointees must be recognized as wholesome and proper precautions, as against methods of unrestrained and practically non-competitive selection. Though these beneficial results may not be as quickly realized as may be desired by those who view the interests and ambitions of the profession as of easy attainment, there is no doubt that they will be realized in large measure and at an early date.

We fear there are but few who realize fully the immense importance of the recent army and navy dental legislation to the status of dentistry as a profession among the profession represented in the military and naval services, and we therefore offer for your information and fuller appreciation the following analysis of the effect of the previous non-recognition and the present legal recognition of dentistry.

Before the enactment of any army and navy dental laws was secured by your committees, the situation was simply as if the words "dentistry," "dental profession," and "dental surgeon" had no significance. Having no recognition in law, the dental surgeon in the military service could have no professional rights under the law. In the few individual and unauthorized cases of the assignment of men to do military dental service, the graduates in dentistry of our great universities and the enlisted man in the navy stood on equal social and professional footing, not merely in theory but in law and in fact, as was demonstrated by actual experience in particular cases. They had no right to their civil title or benefit of their college degree, nor to a position indicative of their function, nor to any degree or equality with "an officer and a gentleman," from whose social position theirs differed as widely as does that of

the non-English-speaking laborer from that of the manufacturer who employs him, or as that of the valet from his employer. These are not exaggerations, but easily demonstrable illustrations of the condition that prevailed—surely a reflection on the civil status of dentistry!

What of the present—and, for that matter, of the future—of dentistry in its relation to the other professions in the naval service? Under the recent act of Congress, passed in pursuance and in consequence of fair hearings on the real issue, namely, the recognition of dentistry as a profession on a social and educational basis with other professions, the United States government is committed to the official recognition of dentistry. Therefore it is provided by law that the navy dental surgeon "shall take rank and precedence in the same manner and in all respects as in the case of appointees to the medical corps," and shall have "the same pay and allowances as officers of corresponding rank and length of service in the medical corps," and shall be entitled to retirement "in the same manner and under the same conditions as medical officers." They are also eligible, under the provisions of the law of 1912, to membership in the medical reserve corps of the navy, and additionally, to constitute a dental reserve corps under act signed by the President March 4, 1913, which creates a dental reserve corps differing in no respect from the medical reserve corps, except that the qualifying degree is extended to include that of D.D.S.

Could any act of Congress be so phrased as to more forcibly and impressively carry the government's stamp of approval of dentistry, and more emphatically remove the stigma attached to it previously? or could any single act of the government more definitely or forcibly acknowledge the value of the educational course of the dental schools of America, or more gracefully acknowledge the importance of the function of the dental surgeon, than has been done by the recent acts of Congress?

There is now authorized the expenditure of about $500,000 per annum to meet the dental requirements of the army and navy, with an automatic proportional increase as the army and navy *personnel* is increased.

We are not to rest on the advantages gained. There must be promotions of dental officers in both the army and the navy, and we are confident that we are justified in assuring you that our work has made this next step probable at an early date.

In conclusion, we desire to inform the association that on April 23, 1913, the President of the United States appointed and the United States Senate confirmed the following gentlemen: Dr. Wms. Donnally, Dr. V. E. Turner, and Dr. G. E. Küsel to commissions in the navy dental reserve corps.

Respectfully submitted,

Wm. Crenshaw, *Chairman,*
Chas. W. Rodgers,
Wm. H. DeFord,
Committee.

On motion the report was received, and made the first order of business at the next session.

On motion the House of Delegates adjourned to meet at 9 p.m.

THIRD SESSION.

The House of Delegates was called to order 9 p.m. by President Hetrick. The following states answered "present" on roll-call: Alabama, Arkansas, California, Colorado, District of Columbia, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Nebraska, New Mexico,

National Capital, Ohio, Oklahoma, Texas, Wisconsin.

The PRESIDENT. We will now take up the report of the Legislative Committee, and will have to rule that this report and the resolution cannot be acted upon at the same time.

Dr. BARBER moved that the debate be limited to ten minutes, which was duly seconded and carried.

The President announced that the report of the Legislative Committee would be taken up first, and that it was open for discussion.

Dr. O. U. KING moved the adoption of the report, which was seconded by Dr. Bruening and carried.

The President announced that the following resolution, submitted by the Legislative Committee, would be taken up:

RESOLVED, That the National Dental Association in convention assembled at Kansas City, Missouri, July 8 to 11, 1913, directs the secretary, under the seal of the association, to express our appreciation of President Woodrow Wilson's recognition of our profession by his recent appointments to commissions in the United States Navy dental reserve corps.

Dr. BRYANT discussed the resolution and offered an amendment. [See page 33.]

Dr. B. HOLLY SMITH moved its adoption, which motion was duly seconded.

Dr. RODGERS announced that as a member of the committee, he could not consent to this, and Dr. Smith requested permission to withdraw his motion. The Chair ruled that the motion could not be withdrawn without the consent of the second. This consent was not granted, and a call was made for the aye-and-nay vote. This not being definite enough, the Chairman called for a rising vote, and announced that the amendment was lost and that Dr. Bryant had the floor.

Dr. BRYANT called for a ruling as to the status of his amendment. The President announced: "Dr. Smith's motion was that it be added to the resolution offered by the committee, and I shall have to rule that it was lost. I said you had the floor. The addenda you offered is not a part of the resolution that we will consider now; it was lost."

Dr. Bryant addressed the House of Delegates, and read a number of letters and documents bearing upon dental legislative matters and his activities in connection therewith.

The President announced that the time limit was up, but Dr. Bryant requested time enough to further discuss the matter and Dr. Barber moved that he be granted ten minutes more time. The President said that it would have to be by unanimous consent, and Dr. Crenshaw announced that he objected.

The resolution was discussed by Drs. Rodgers, Crenshaw, and others, and on motion was adopted.

Dr. CRENSHAW announced that there was another matter the committee wished to present before adjournment, and requested that Dr. Rodgers present it.

Dr. RODGERS stated that he had an additional resolution, but the Chair ruled that it would come before Council at 10 tomorrow morning.

Dr. B. HOLLY SMITH presented the following amendment, to follow the word "session" in Section 9, Chapter IV, of the By-laws:

Providing, That when an accredited delegate finds it impossible to continue his services, his regularly selected alternate shall be entitled to be seated. In the absence of the regular alternate, such vacancy shall be filled by the delegates from such state, from the alternates present.

Dr. B. Holly Smith moved that the Proceedings of the 1913 meeting be furnished to those who paid the regular dues of $5.00, and in addition thereto, that the Proceedings be furnished to such members of constituent societies as have paid their dues through a constituent society on the basis of $1.00 per member. The motion was duly seconded and carried.

On motion adjourned to meet at 10 A.M. Friday.

FOURTH SESSION.

(July 11th, 10.30 A.M.)

The House of Delegates was called to order by Dr. Homer C. Brown, at 10.30 A.M.

In the absence of President Hetrick, the President-elect was selected to act as temporary chairman.

States answering "present" to the roll-call were as follows: Alabama, Arkansas, Colorado, District of Columbia, Georgia, Illinois, Indiana, Massachusetts, Minnesota, Mississippi, Nebraska, Ohio, Oklahoma, Pennsylvania, Wisconsin, National Capital Society.

The Chairman announced that the first question to be considered was the amendment offered at the previous session by Dr. B. Holly Smith, amending Section 9, Chapter IV, of the By-laws. [See page 36.]

On motion, duly seconded, the amendment was unanimously adopted.

Dr. Black moved that if there were any alternates present from states which were not represented by regular delegates, that they be accredited for this meeting. (Motion seconded and carried.)

Dr. Ottolengui having left, Dr. L. Meisberger was accepted as the accredited delegate from New York.

Dr. Black moved that the president and general secretary be empowered, if they deem it wise, to publish during the coming year, an Official Bulletin, to be sent to the members of the association. This was seconded by Dr. Hassell.

Dr. Seip offered an amendment to the motion to the effect that the Publication Committee appointed by the Board of Trustees have charge of issues of this Bulletin.

Dr. Brown suggested that in order to stimulate affiliation of all societies, it would seem advisable to send this Bulletin to the membership of every state dental society, regardless of whether or not they are component societies.

Both the amendment and the suggestion were accepted by Dr. Black, and unanimously carried.

Dr. Hetrick arrived and assumed the chair.

The Secretary read the report of the Committee on Patents, which was referred to the House from the Executive Council. [See page 26.]

On motion by Dr. Boardman, seconded by Dr. Bruening, the report was adopted.

The Secretary then read the resolution relative to the Panama-Pacific Dental Congress, referred to the House of Delegates by the Executive Council. [See page 22.]

On motion by Dr. Finley, seconded by Dr. Boardman, the resolution was adopted.

Dr. Chas. W. Rodgers read the following resolution submitted by the Legislative Committee:

Resolved, That the National Dental Association, in annual session, hereby heartily approves of the recent act of Congress authorizing a reserve and provisional corps of dental

surgeons whose members shall be appointed by the President and confirmed by the Senate, and hereby commend co-operation of the profession with the Navy department in a widespread effort to attract to the navy dental service those best equipped and most suitably qualified to meet the needs of the naval *personnel.*

Dr. SEIP moved the adoption of the resolution, seconded by Dr. Meisberger.

Dr. BRYANT called attention to the fact that this was new business and in accordance with the by-laws would require the unanimous vote of the house, and stated that he objected to the resolution.

This was discussed by Drs. Black, Rodgers, Finley, Boardman, and Bryant. The Chair sustained Dr. Bryant. Dr. Boardman appealed from this decision, and upon vote the appeal was sustained.

The Chair declared the resolution open for consideration. Vote was taken on the resolution and carried by 19 in favor and 3 against.

The Chair then read a communication from the National Association of Dental Examiners, with the resolution adopted by that body, as follows:

RESOLVED, That the National Dental Association be requested to change the time of its meeting to a later date when the weather conditions are more comfortable.

JOHN P. STIFF, *President,*
T. A. BROADBENT, *Sec'y, N. D. E. A.*

On motion, duly seconded, this resolution was received and referred to the 1914 House of Delegates.

The Secretary read the following resolution regarding the National Dental Protective Association, which was referred to the House of Delegates by the Board of Trustees:

In view of the fact that the decision in the highest court of the District of Columbia to which the Taggart-Boynton case could be carried resulted in as complete a sustaining of the defense as could be attained, to the effect that the Taggart patent was invalid, and inasmuch as more recently in Chicago in a suit embodying the same and three other patent claims, the decision in a lower court upheld the Taggart claims, it seems advisable to get an expression of as representative a body as this is, as to the justice of the contentions to have the validity of these patents determined by the highest court; therefore be it

RESOLVED, That the House of Delegates of the National Dental Association indorses the action taken by the National Dental Protective Association in their efforts to have determined the validity of these patents.

Dr. SEIP moved and Dr. Boardman seconded the adoption of the resolution.

Dr. BRYANT raised a point of order that this was new business and in accordance with the by-laws would require unanimous consent for adoption, and stated that he objected. The Chair sustained the point of order.

Dr. GEILFUSS moved to appeal from the decision of the Chair, and the appeal was carried.

The resolution was discussed by Drs. Geilfuss, Black, Finley. Hetrick, Boardman, Yerke. Seip, and Gaylord. Vote on the resolution was taken and declared carried.

Dr. BLACK asked to be recorded as not voting.

The President read an invitation from Hot Springs, Ark., requesting the association to meet there in 1916.

Dr. BLACK moved that the House of Delegates express its appreciation to Dr. Frank O. Hetrick for his conduct of affairs, as presiding officer, during the meeting.

The motion was duly seconded and put by the Secretary, and unanimously carried.

On motion, the House of Delegates adjourned until the next annual session.

HOMER C. BROWN, *Secretary.*

BOARD OF TRUSTEES.

FIRST SESSION.

(July 10th.)

Pursuant to call, the new Board of Trustees held their first meeting at 2 p.m., July 10, 1913, with the following members present: Drs. Burkhart, Buckley, Hinman, Hartzell, Grieves, Warner, Melendy, and White.

In the absence of President Hetrick, Dr. Hinman moved that Dr. Burkhart act as temporary chairman. Motion seconded and carried.

In the absence of Secretary Brown (who arrived later), Dr. Otto U. King was selected to act as temporary secretary.

Dr. Weston A. Price addressed the Trustees relative to the *personnel* of the National Dental Scientific Research and Foundation Commission. Upon motion the following commission was selected:

Weston A. Price, Cleveland, Ohio.
Thomas P. Hinman, Atlanta, Ga.
Clarence J. Grieves, Baltimore, Md.
John V. Conzett, Dubuque, Iowa.
Eugene R. Warner, Denver, Colo.
Edward C. Kirk, Philadelphia, Pa.
Wm. Carr, New York City.
Truman W. Brophy, Chicago, Ill.
G. V. Black, Chicago, Ill.
M. H. Fletcher, Cincinnati, Ohio.
Thomas B. Hartzell, Minneapolis, Minn.
Arthur R. Melendy, Knoxville, Tenn.
Edward S. Gaylord, New Haven, Conn.
Henry C. Ferris, New York City.
Charles C. Allen, Kansas City, Mo.
Frank O. Hetrick, Ottawa, Kansas.
Marcus L. Ward, Ann Arbor, Mich.
Frank L. Platt, San Francisco, Cal.
C. S. Van Horn, Bloomsburg, Pa.
R. H. Volland, Iowa City, Iowa.
C. M. McCauley, Abilene, Texas.
George E. Hunt, Indianapolis, Ind.
Eugene H. Smith, Boston, Mass.
J. E. Chace, Ocala, Florida.
Samuel H. McAfee, New Orleans, La.

Dr. Wheeler presented the report of the Journal Committee. [See page 26.]

On motion adjourned.

SECOND SESSION.

(July 11th.)

The Board of Trustees was called to order July 11th, 9.30 a.m. by Dr. Burkhart, with the following members present: Drs. Hetrick, Hinman, Buckley, Hartzell, Warner, Grieves, Melendy, White, and Brown.

Dr. Hartzell presented the following resolution, which was adopted:

Resolved, That the question of the publication of the Proceedings be left with a committee of three, consisting of the president, the general secretary, and Dr. H. J. Burkhart, with power to act.

Dr. Buckley moved that the matter of appointing the Committee on Local Arrangements for the Rochester meeting be left in the hands of the president, who would consult with the Rochester men in doing so. (Motion carried.)

Dr. Hartzell moved that the president, the general secretary, and Drs. Burkhart, Buckley, and Grieves constitute an *Ad-interim* Committee to carry on the work of the Trustees during the

period of preparation for the Rochester meeting, with the full power of the Board of Trustees, while the said board is not in session. (Motion carried.)

Dr. HINMAN moved that the *Ad-interim* Committee keep a record of its proceedings, to be read at the next meeting of the Trustees. (Motion carried.)

The question of appointing the section officers for next meeting was discussed.

Dr. HINMAN moved that the president be empowered to appoint the officers of the several sections for the year 1914. (Motion carried.)

Dr. HINMAN moved that the general secretary be allowed $50 per month, payable monthly, for stenographer's services, and that the matter of the general secretary's compensation be determined next year. (Motion carried.)

Dr. MELENDY moved that the salary of the treasurer be continued at $200, as heretofore, and that the treasurer be directed to furnish a bond satisfactory to the *Ad-interim* Committee—said bond to be paid for by the association. (Motion carried.)

Dr. GEILFUSS presented a resolution with regard to the Taggart patent litigation [see page 38.] (Received and referred to the House of Delegates.)

The Secretary presented a report from Dr. Henry L. Banzhaf, secretary-treasurer of the Educational Council of America, which on motion was received and filed for information, but on account of the length of the report it was not considered necessary to publish in the Transactions. [See also page 23.]

Dr. CHAS. W. RODGERS presented a resolution from the Legislative Committee, which on motion was received and referred to the House of Delegates. [See page 37.]

The matter of appointing a recording secretary for the Board of Trustees was postponed until next year.

REPORTS OF THE AUDITING AND CREDENTIALS COMMITTEE.

Dr. VICTOR H. JACKSON, Chairman of the Auditing and Credentials Committee, presented the following reports:

KANSAS CITY, MO., July 11, 1913.

The Auditing Committee of the National Dental Association respectfully report that they have examined the Treasurer's books and accounts, and have audited and approved the same.

The committee also audited all association accounts and bills presented to date, and therewith appended their signatures.

VICTOR H. JACKSON, *Chairman*,
VICTOR S. JONES,
MARK F. FINLEY,
Auditing Committee.

KANSAS CITY, MO., July 11, 1913.

The Committee on Credentials of the National Dental Association for the year 1913, in addition to their duties as defined by the constitution, adjusted their work as far as practicable to the resolutions and rulings toward the establishment of the newly adopted constitution, and respectfully present the following report:

The committee examined all credentials presented, and issued 1100 badges to members and members of state societies which had signified favorably their intention to become constituent members, the names of whom are as follows:*

VICTOR H. JACKSON, *Chairman*,
VICTOR S. JONES,
MARK F. FINLEY,
Credentials Committee.

On motion the Board of Trustees adjourned, subject to the call of the president.

HOMER C. BROWN, *Secretary.*

* On account of the length of the list it was not considered necessary to publish the 57 pages of names above mentioned, but they have been filed for reference.—PUB. COMMITTEE.

President's Address.

By Dr. F. O. HETRICK, Ottawa, Kansas.

MEMBERS OF THE NATIONAL DENTAL ASSOCIATION, LADIES AND GENTLEMEN:

You have listened to the welcome from the high officials of our city—Kansas City belongs to Kansas, therefore we say our city—and I want to emphasize their welcome to you, my brethren, to our home. But once before has a dental convention of national proportions met in this section of the country, and that was when the American Dental Association met at Excelsior Springs, Mo., nearly thirty years ago.

We are highly honored by your presence among us again, and are delighted to say so. Let me say that we are glad —glad and proud—to welcome you here!

TIME OF MEETING.

This brings me to the first recommendation I have to submit for your consideration—viz, the time of meeting. The time of our meeting should be permanently changed to a more comfortable season of the year. We have reached a stage in the evolution of this organization when the convenience of the greater number should be taken into consideration. A change in the time of meeting might make a difference in the attendance at the first few annual sessions, but I firmly believe that, if tried for a reasonable time, the association could not be induced to again hold its meetings in the summer season. Compare the comfortableness of the going, coming, and time spent at the session held in Birmingham, Alabama, during the month of March, with any session held in recent years, and the evidence is all in favor of the Birmingham meeting. I have no recommendation as to the exact date, but I would suggest that the meeting be held not earlier than October nor later than March. Precedent and some argument is against such a change—but who wants to take a vacation and attend a dental convention at one and the same time?

THE NEW CONSTITUTION.

During this session of the National Dental Association we begin work under the new constitution. The revision of the constitution has been one of the storm centers for the past five years, and the past year has been no exception. We hope our differences will be amicably settled and that hereafter we may all work together in harmony and be factors in the upbuilding of our association

upon a foundation that will be worth while and will endure. Too much of the time of this association in the past few years has been given to the settlement of personal differences and local difficulties, but with the larger house of delegates it is possible that this condition can be eliminated, and it should be, with no uncertain measures—the big stick if necessary. A house divided against itself cannot stand, and I would urge that every member take the broadest possible view of the questions that come before us and work for the upbuilding of the National Dental Association. There are plenty of aggressive movements upon which all our time and energy may well be expended, and which will bring greater results.

THE DENTAL JOURNAL.

There have been recently several movements inaugurated which are of vital importance to our profession, but to my mind the one demanding our first attention is the establishment and financing of our own dental journal. The machinery to accomplish this should be very definitely set in motion at this meeting, and our own journal should be established, and upon a solid foundation, not later than the year 1915. Several methods of financing this enterprise have been suggested, one of which is that five hundred life memberships at fifty dollars each be sold, thirty dollars of each membership to be set apart in an investment fund, the interest from which would pay the annual dues of the members who bought life memberships. This would give a fund of fifteen thousand dollars with which to establish our own journal. Whatever method may be employed, definite steps should be taken at this session, as it will take at least two years to accomplish our object.

THE SCIENTIFIC FOUNDATION FUND.

From this time the work of the Research Committee and the Scientific Foundation Fund Committee should be merged into one. You will hear the reports of these committees later, and I wish to call especial attention to them. One of the greatest movements started by this association was begun at our meeting last year. When you hear the report of the chairman of the Scientific Foundation Fund Committee, I am sure you will be gratified beyond your fondest hopes. What has been accomplished is but a slight forecast of the possibilities if the proper form of organization is adopted. The organization should be effected in such a way that it will be competent to handle large sums of money, and of such a character as to appeal to men of large affairs. It will be necessary to place upon this committee some men of national reputation who are already familiar with methods and means of organizations of this character, and who are already in touch with great problems. You will hear this more in detail from Dr. Weston A. Price in his report. Opportunity is knocking at our door; more institutions than we can use have thrown open the doors of their laboratories and have bidden us enter. Shall we heed the call? I feel that I cannot urge upon you too strongly that we should avail ourselves of these opportunities immediately. Compare the possibilities before us at present with the meager little sums that we have spent each year in the past upon research work.

Fifty years ago the dwellers on plains said there would never be a city of any importance built upon the bluff where Kansas City now stands; but there were men of splendid courage among those pioneers, and today you see the result of their convictions in that the hills have been cut down and filled into the low places, and this is yet but the beginning. Just so must we look and build for the future.

THE NATIONAL RELIEF FUND.

The work of the National Relief Fund Committee should have our most hearty support. This should come more particularly from the individual dentist himself for the relief of his unfortunate brothers.

THE CROCKER LAND EXPEDITION.

During the past year the Crocker Land Expedition, under the auspices of the American Museum of Natural History and the American Geographical Society, with the co-operation of the University of Illinois, has been fitting-out—an expedition whose object is the exploration of the last great land mass on the surface of the globe. The matter of the need of a dental equipment for this enterprise was brought to the attention of your president, and Dr. C. B. Warner of Urbana, Illinois, was appointed a committee of one to secure the necessary dental supplies for such an expedition. Permit me to quote from a letter from the leader and ethnologist of the expedition, Dr. Donald B. MacMillan. After extending his thanks for the "excellent supply of dental material and equipment," he says: "Our dental equipment is perhaps as complete as any we have, and I am sure every member of the expedition appreciates your gift. The physician has had special dental training, and will be able to give the members of the party temporary dental service other than extracting, and thus save their teeth until they return to civilization." Dr. Warner deserves special commendation for the active interest he has taken in securing the necessary dental supplies for the expedition.

DENTIST APPOINTED TO STATE BOARD OF HEALTH.

I am sure it is a source of gratification to you all to know that the Governor of Ohio, Hon. James M. Cox, has taken an advance step in appointing as one of the members of the State Board of Health a dentist and one of our members, Dr. Homer C. Brown of Columbus, Ohio. I would suggest that a committee be appointed under authority of this body to draft suitable resolutions commending Governor Cox for this action, and that a copy of said resolutions be forwarded to him.

I wish in closing to express my deep appreciation of the honor you have conferred upon me by elevating me to this high office. For the future I bespeak the greatest harmony in our association, and hope that upon the two great problems confronting us, the journal and the Scientific Foundation Fund, we may present a solid, unbroken, aggressive front.

Synthetic Porcelain, Using Mallet Force for Introduction.

By CLYDE DAVIS, M.D., D.D.S., Lincoln, Nebr.

THE term "synthetic porcelain" is one which should be applied to all processes in which an attempt is made to manufacture porcelain. Synthesis is the opposite of analysis, and means the uniting of elements to form a compound. We have synthetic rubber —also synthetic eggs—and, correctly speaking, dentists manufacture synthetic gypsum when they make a plaster-of-Paris model.

In all the attempts made to manufacture a dental filling of the silicates, the powder is composed largely of the same ingredients as fusible porcelain—that is, silex, kaolin, feldspar, water, and pigments.

PROPORTION IN THE INGREDIENTS.

In all synthetic processes the final result may be chemically quite like the original; yet in most instances there is a considerable difference in the physical properties of the product, as well as in the several different attempts at manufacture. In all of the synthetic processes the best results are obtained by having the ingredients as nearly as possible of the same proportions as found in the materials produced by natural processes. To illustrate: We have a plaster-of-Paris model more nearly resembling the gypsum rock when the mix is made as thick as possible and yet constituting a homogeneous mass (*i.e.* 21 per cent. of water and 79 per cent. of calcium sulfate). Or, in other words, there must be an abundance of the basal ingredients. This rule is true of the production of synthetic porcelain. In order to obtain the best results, the mass must be heavy with these basal ingredients, much thicker than is produced when following the instructions of the manufacturers of the various silicates.

SECURING HOMOGENEITY.

It is absolutely essential in all synthetic processes that the mass be homogeneous. Before the process of setting begins we have a mixture of fine sand and a fluid, which is like a mixture of fine sand and water—and it is practically impossible to produce a very thick mixture of sand and water by the process of spatulation and have that mixture homogeneous. In endeavoring to overcome this difficulty I have devel-

oped a method which has proved entirely successful, and which has produced a filling that is uniform as to time occupied in setting as well as uniform in texture, is stress-resisting, and seems to be far superior to the fillings which are produced by the advertised method.

This method is as follows: Put a small quantity of fluid on the slab, adding powder from time to time in a hurried manner, spatulating until there is produced a mixture as solid as very thick putty, even to the point where it has lost practically all adhesive property. The mass should be quickly worked into a compact form and then patted or paddled with a clean part of the agate spatula. I term this plan of mixing, the puddling process. With this process, viewing the mass under the magnifying glass the effect is seen to be quite similar to that in the manipulation of moist sand. You have all illustrated the process by patting the sand on the beach with the foot, when bathing.

We attain this same result when preparing a homogeneous mass in making a fused inlay. This is done by jarring the mixture as it is held in the matrix, the most common method being to draw a file across the pliers holding the matrix. Those who are familiar with porcelain work will notice the similarity of results when patting this otherwise dry and unworkable mass of synthetic porcelain.

The puddling process requires only a few light blows with your spatula, when the proper shade will immediately show up and the surface will gloss. The material is then ready for the cavity. The conditions as to the use of the matrix and as to the surface exposed should be the same as for introducing an amalgam filling, using the mallet force.

APPLICATION OF THE PORCELAIN TO THE CAVITY.

In approximal cavities in anterior teeth, the matrix should be used to supply the missing lingual and approximal walls. In approximal cavities in molars and bicuspids, the missing axial wall is restored with the matrix. The porcelain is carried to the cavity with a small agate instrument; take from the mix a quantity sufficient to about half fill the cavity. Wipe this hurriedly against all walls and into all angles, being sure the margin next to the matrix is covered.

The second portion taken should be sufficient to more than fill the cavity. This is applied hurriedly and the approximate contour secured. Immediately apply the plugger point which I will describe later. This should be dipped in melted cocoa butter, all excess being wiped off. This precaution is to prevent the material from partially adhering to the flat face of the plugger point. Apply mallet force to the plugger, using a very light blow with a light mallet. I will describe the mallet later.

If this process be viewed under a magnifying glass, it will be seen that the porcelain again develops the normal color, and the surface looks glossy and wet just as it did on the slab.

The blows at first should be light, and the plugger point should be held back so as not to distort the contour. As the setting process begins there will be noticed a resistance which feels as though one were malleting a piece of rubber. Before this condition arrives, the effect is to produce a homogeneous mass. As

the setting process begins, a slight condensation takes place as the particles of sand are driven into closer adaptation, removing many little spaces which exist, and which is analogous to bridging in building a good filling. Fifteen or twenty blows will probably constitute the entire process. Just before the last four or five blows the plugger point should be dipped in cocoa butter and carried to the filling so that the entire surface is flooded. If the process of malleting be carried on too long the filling will begin to take on a lighter shade, which is the result of breaking up the process of crystallization, and irreparable damage is done.

ADVANTAGES OF THIS FILLING. THE SPECIAL PLUGGER POINT AND MALLET.

Fillings so produced will all set in practically the same time, which is at least twice as soon as by the method published by manufacturers; the maximum edge strength is always obtained, and the filling will be entirely uniform and superior in every desired respect.

As to the plugger point referred to, I have made it out of platinized gold. I pass it around for your inspection. This plugger point could be made of any material which it would be possible to keep clean and having a surface sufficiently hard to always remain intact. The form shown seems to be the best for most cases.

I also pass around the mallet, which you will notice is very light and has a soft surface. The reason for this kind of mallet is quite apparent. If you will revert to the sand-and-water mixture mentioned, you will readily agree with me that the light blow is the one to be desired.

To illustrate: Make a very thick mixture of sand and water. You can easily puddle this with a light paddle, whereas if you strike the mass with an iron hammer and a heavy blow, you will make a very dry mixture at the point of contact, driving the water to the periphery. Is not this the principal reason for so many fillings having poor edge strength? We have been taught to crowd them into the cavity with a spatula and then draw a matrix tightly over the mass while setting. If such manipulation be indulged in before the setting process begins, it will certainly tend to crowd the fluid out of the central mass and spread it about the margins of the filling. In this case one will not only have a mass that is not homogeneous, but one that is altogether too fluid in the region of the margins. If the spatulation or crowding of the matrix be done after the process of setting has begun, cracking of the mass will certainly result in destroying the texture of the filling.

FINISHING THE FILLING.

Manufacturers have cautioned us not to use steel instruments in finishing these fillings. No instrument coated with an oxid should be used in placing the material before the setting process begins, as particles are liable to be dislodged and incorporated in the body of the material as a mechanical mixture; this later affects the color of the filling by further chemical dissolution or combination.

After the filling, however, has been condensed and properly surfaced, particularly if it has been coated with cocoa butter, any clean instrument or a steel file may be used with impunity without involving any discoloration. I make it

a practice to trim the fillings with a clean, keen-edged chisel and fine finishing files such as are used for finishing gold fillings. The margins do not break, nor do the fillings discolor, and I have as yet to see a single filling injured thereby.

If the mallet force has been employed in introducing the filling it will be necessary to do all finishing within a few minutes after placing the filling, as when the setting is complete it will be so hard that a new gold-trimming file or plug-finishing knife will slip off of the surface as it would from that of glass. When a high polish is desired, a second sitting may be resorted to, and the polish secured by the use of disks and strips carrying a fine grit. It has been my experience, however, that the best shades are secured by finishing the filling at one sitting, which may be begun in four or five minutes after completing the malleting and the entire process finished fifteen minutes later.

REASON FOR USE OF COCOA BUTTER AND OF WAX.

In no case should the surface of the filling be allowed to become cleaned of the cocoa butter, as exposure to the air during the process of setting allows water evaporation and will destroy the color as well as the texture on the surface of the filling. The profession does not seem to be entirely clear as to the reason for using cocoa butter and wax, which is this: During the process of setting, the cocoa butter prevents the evaporation of moisture. As soon as the setting process is complete the filling will absorb moisture for some little time, entirely reversing the process. These two conditions are true of a plaster-of-Paris cast. For this reason we use a wax to coat the filling when complete, to remain in place for at least twenty-four hours. If the wax be not used, the filling absorbs the fluids of the mouth, which implies the carrying-in of organic substances that will later decompose and by a process of oxidation will produce discoloration.

The white wax which has recently been furnished with the porcelain is entirely worthless, as it seldom remains in position longer than a few minutes or hours. The form of sticky-wax which was first put out for this purpose in the little glass tubes, and is yellow, is ideal.

DURATION.

As to the length of time any of these synthetic porcelains will stand in a practically perfect condition, no one can say. We have had invariable success so far. There is no question that such a filling will last and preserve the teeth for a number of years. Some years from now the profession will be able to judge as to final results.

It is very difficult to get a correct and adequate contact point in approximal fillings. Synthetic porcelain requires time and experience in manipulation to be able to produce a correct contour when working as hurriedly as the manipulation of this material demands. One cannot be sure that correct contact point, even though it be secured, will be maintained. It is questionable whether or not it will resist interproximal wear; I predict that it will not. Dr. Black states that in a mouth forty years of age, where no cavity existed, the approximal wear in the length of the entire arch was equivalent to one-half the width of a bicuspid in that mouth. This was the result when the approximal surfaces were covered with normal enamel.

The possibility of building a filling of synthetic porcelain so as to resist such wear is very questionable.

The profession should also be cautioned about using this material unsupported in angle restoration in the anterior teeth. At the incisal edge we have a cord-of-wood proposition to deal with in both labial and lingual enamel plates, as the stress is sidewise to the enamel rods. The incisal edge must be beveled to the axial when using any filling, or the enamel margin will not stand. It is possible to make a gold inlay protecting this incisal edge, leaving the labial face open to receive a porcelain filling after setting the inlay. We have found this method a temporary solution of this problem in class IV fillings.

Yet the synthetic porcelains, with all their faults, are being accepted as quite ideal in many cases, and should be taken up by every practitioner, in order that he may develop the maximum skill in their use. The manufacturers are spending large sums to assist us in this work. It is certainly up to us to do our part. However, those of us who are studying this new material have found that we cannot simply buy the package, secure a patient, and make a perfect operation. It takes much laboratory work, and a large number of attempts, to obtain ideal results. It takes a longer time to learn the correct use and manipulation of any of the porcelains than it does to make a good gold inlay. In fact, one has found in the teaching of students that it is next to cohesive gold in the time required to master its peculiarities.

A WORD ON CAVITY PREPARATION.

The length of this paper forbids a consideration of cavity preparation for synthetic porcelain, hence I will close with a general statement applicable to all cavities Be sure to have the full cleavage of the enamel. Keep the margins as far as possible from excess stress. Avoid acute angles in filling material. Every cavity should have retentive form equal to that desired for amalgam. Vital pulps need fully as much protection as when using cohesive gold or amalgam. Be sure all decay is removed from the dentinal walls, as the acid of tooth decay seems to be absorbed by the filling after setting, affecting both color and texture.

Bear in mind that the material while setting gives off moisture, and that the dentin must not be desiccated, particularly in non-vital teeth, as it will absorb moisture from the material to the ruination of the filling. It is good practice to varnish the dentinal walls in all deep cavities.

Lastly, while this filling is as yet far from perfect, it deserves honest consideration by every practitioner.

Discussion.

Dr. G. A. Crise, Manhattan, Kans. "There is a tide in the affairs of men, Which, taken at the flood, leads on to fortune"—and there is a tide in the affairs of men as operators, which, if taken at the flood, leads on to perfection —and that is what we are after in this convention. We gather to discuss the different phases of dentistry and discover different ways of doing work because we desire to arrive at perfection in the thing we are most interested in.

I have read Dr. Davis' paper over thoroughly, and have tried to make the very best analysis of every phase of it. In the use of silicate cements I have

spent about five years in research work and practice, and I believe that we are reaching the perfection point in the working of silicate cement fillings—that they are going to be a great boon to the dental profession in the way of esthetic work.

I do not agree with the essayist on some points that he mentions; in the first place, in the mix. I agree with him in the way he mixes silicate cements, but I do not agree that, when we insert the filling, it is absolutely necessary to use mallet force. I do not assert that he is not right; however, the opportunity comes for you and me to work out this problem in our own offices.

There is a different way of mixing each of the silicates on the market, and we have to use a different mix with every one. I take it for granted that Dr. Davis is referring in his paper to DeTrey's porcelain. This porcelain is peculiar to itself; the way in which the molecular parts come together is different from any other silicate on the market. The humidity of the dental office has a great deal to do with the silicate filling; an office kept at a temperature of about 65° would be about ideal for manipulation and mixing, but I do not agree that when the material is puddled on the slab and put in the cavity one would obtain a better filling by using mallet force to drive the material against the walls of the cavity than by inserting it in the way the manufacturers recommend.

I received the essayist's paper on the 25th of June, and had but little time to try his method in my office, but I did something in that direction. Of course I am a novice, but I have found already that the color and shade of the filling is the same upon the slab under the magnifying glass as it is in the mouth under the mallet. I do not believe that we get a better texture by mallet force than by the process laid down by the manufacturers. When we have the cavity prepared, the slab ice-cold and the spatula ice-cold, when all conditions are right, and the thermometer is at about 65° or 70°, the longest time the synthetic cement can be held at the exact point at which it must be inserted is about two minutes; after two minutes the point is passed at which the filling may be disturbed, else the action of the component parts in its setting qualities will be disturbed. After the filling is inserted it must immediately be coated with cocoa butter, and must be kept so for ten minutes, because synthetic cement has in it a component part of water, which must be retained in the filling for ten minutes; after ten minutes it has undergone a change, and we can finish the filling, which must then be coated with wax that is to be left only for two hours, this being the longest time advisable; I would rather have this wax stay one hour than two, about one hour and a half being better in a great many instances, depending a great deal on the conditions in the mouth. But that filling must have water then. Dr. Davis says that it must be twenty-four hours, but there I do not agree with him—because, like Portland cement, it must have water in order that it may assume the stone-like consistence of Portland cement, and we must have the same condition as in porcelain. Synthetic cement is made of different materials. All of the silicate fillings on the market have about the same ingredients, but DeTrey's synthetic is different from the silicate cements. By

combining certain elements a preparation has been produced that, when inserted in the cavity, assumes a porcelain-like state, fulfils the same conditions as porcelain—and is, in fact, a porcelain.

After the filling is finished, or rather after it is inserted, I use chisels as Dr. Davis has suggested. I use the disk also as Dr. Davis suggested, and I use the wax that is sold with the cement, which is nothing but paraffin, and I instruct the patients, "In two hours from now, take that off the filling." I have demonstrated silicate cements for two years and I find that, if the wax is left on longer than twenty-four hours, the filling, when the saliva strikes it, assumes a different condition. I cannot explain this phenomenon, but, when the filling is examined under the magnifying glass, we see a difference. Anyone can make this experiment by observing one filling twenty-four hours after it has been coated with wax, and another two hours after it has been coated with wax. In the latter case a better result, more crystallization, a more healthy appearance in the filling will be noted. In that regard I do not agree with Dr. Davis, yet we are all striving for perfection. I hope to demonstrate these points in the clinic I shall give tomorrow, when it will be seen that a synthetic cement filling requires as careful or more careful technique than any other filling. I think it is really harder and requires more skill, more dexterity and more ability, to insert a good synthetic filling, that cannot be detected at a glance in the mouth, than any other filling, and if we are successful with synthetic cement fillings, then we have arrived at that ideal which we are all striving for.

Dr. L. L. Barber, Toledo, Ohio. I first want to say that in my belief the silicate cements are among the best filling materials we have for certain places. Next, that there is no silicate cement on the market with which I am familiar—and I believe I am familiar with all of them—I do not believe that there is one the manufacturers of which have not changed the directions for mixing from one to five times. When Aschers "artificial enamel" appeared first upon the market, I purchased a forty-dollar package. I took instructions for the mixing from their expert, and went home and used that forty-dollar package in my laboratory before I ever attempted to make a filling in the mouth. Then I thought I was equipped to do some wonderful things. I started in according to instructions, and made as many failures as many of you have made. I then began to make up the different silicate cements as they came along, and when I was in Germany I went with Dr. Ames to Dr. Schoenbeck's laboratory in Berlin, and we studied the whole process there and returned home with a goodly supply of Schoenbeck porcelain, which seemed as though it was going to be an excellent thing—and it was, in its way. In the same way we have taken up the different cements as they presented themselves, and have mixed them according to directions, but the next time we saw the demonstrators and pointed out the defects in their cements, they would immediately say, "You are not mixing it right." They would ask us to show them how we mixed the material, and then they would say we were all wrong, and would proceed to show us the improved way of mixing. You all know the whole mixing process, and how the manufacturers

have changed their formulas, etc. Now comes Dr. Davis, with his method of malleting.

If it were possible, I allow, to follow out in the mouth Dr. Davis' technique in the insertion of cement fillings, I should find very little in his paper to discuss, because I have had my laboratorian, who is a good technical man, make many experiments along the line which Dr. Davis suggests, and I have come to the conclusion that silicate cement fillings, when we can get directly at them with the mallet as Dr. Davis suggests, are denser than those inserted in any other way. The central surface of the filling can be made as dense by putting a celluloid strip around the tooth and going over it with a steel burnisher, but the same result is not obtained in the edges. Instead of distributing the liquid evenly over the surfaces, as in Dr. Davis' method, most of the liquid is carried to the edges because of the fact that the celluloid strip forces it from the center to the edges. That has been my experience. If we could put our foot on this material, and pat it as we do the sand when we go in bathing, as Dr. Davis has said, it would be well and good, but there might be some objections to that method of procedure. My method has consisted in using agate and tantalum burnishers specially made for that purpose, and patting the surface of the filling in the same way with a mallet. This I find to give me the very best results. The same objection, however, prevails there as with Dr. Davis' method, because all surfaces cannot always be reached. Another way is to fill the cavity to excess and not attempt any finishing at all until after a given time.

I find by the aid of the magnifying glass that fillings made in holes drilled in metal—that is the way in which my laboratorian made the tests for density—are much denser if inserted by some sort of tapping or malleting, and the edges are very much better. In regard to the setting of the silicate cements, it has not been my experience that they set much more rapidly when inserted by tapping than by other methods.

Dr. Crise made a splendid point which Dr. Davis did not mention, namely, the temperature of the slab, spatula, room, etc. These are factors that retard or hasten the setting of the cement. Another thing that materially affects the filling is the rapidity with which we add the powder to the liquid. I can take any silicate cement and mix two masses of the same consistence, and have one take twice as long as the other to set, and I will not have spoiled the crystallization of either. Dr. Davis' remark about keeping the silicate cement filling coated with cocoa butter is a very essential point. It is a known fact that the moisture must not be allowed to evaporate from the filling until proper setting has taken place, and that the filling must not absorb the moisture of the mouth until complete crystallization has taken place. I have always thought that it is better to allow the wax to remain on the filling a longer time than two hours. I am not here to say that it is, but in my experience it is better to leave it on longer. A good way to get the wax covering off is to instruct the patient to brush the tooth vigorously at the expiration of whatever time the operator may consider best. Silicate cement fillings, of course, require as much judgment in the manner and selection of place of insertion as any other kind of filling. I believe that Dr. Davis' idea

in regard to the removal of all unsupported enamel is good, but it can be carried out a little farther, probably, than he has suggested.

Dr. Davis (closing the discussion). Replying first to Dr. Crise, I would say that it was not my intention to drive the filling harder against the wall. The malleting is simply a convenient way of jolting the filling. I desire to strike it, as it were, with a stuffed club. I desire to affect the entire mass, and do not think of driving it against the walls. It is placed against the walls and in the undercuts with the spatula; the malleting is simply a means for agitating the mass and producing the effect of puddling while it is in the cavity. The same can be done with the mechanical mallet used in building a gold filling by striking the edge of the tooth, but the patient does not like the effect upon the teeth.

Some have criticized the length of time required in the use of this method. Any kind of cavity can be filled, I think, in as short a time by this method as by any other. I do not mean that one should mallet the filling until it turns white, as such a procedure would ruin it. As to a filling turning white on one side and not on the other, I cannot contribute anything to that observation. My method is to leave the wax on for twenty-four hours, and I have never had one discolor. If we fail to take the wax off, and the filling discolors, there is a reason that we should think about.

I respect Dr. Crise's opinion, because I think he has done fully as much in this line, and more, than I have. I would insist, however, that the points I have mentioned are valuable, and that you try them; if you have failures at first, try them again.

Dr. Barber speaks of making these fillings with burnishers instead of using the mallet with special plugger points. Burnishers will probably answer the same purpose, if they are properly designed for this work.

Dr. Barber also speaks of the varying time required for porcelain to set, and the controlling of the setting by the mix. I am convinced that by the method I have suggested one can obtain a more homogeneous mass and a stronger texture in the porcelain. The jolting process seems to have the effect of causing the porcelain to set in about the same length of time, and is always the same. It produces uniformly good results, and comes more nearly to perfection for some reason. My contention is that we get a homogeneous mass, and a better uniformity of action in the material.

Dr. Crise. When you mallet, do you not accomplish the same results as in making porcelain inlays—that is, draw the liquid to the surface and have not so dense a filling underneath?

Dr. Davis. No; my experience is that it makes a perfectly homogeneous mass.

One of the speakers criticized my remarks in regard to leaving unsupported enamel. You can leave some unsupported enamel the same as in any plastic filling, provided it is entirely removed from stress, as on the labial surface of a tooth.

Report of the Committee on Scientific Research.

By H. C. FERRIS, D.D.S., New York, N. Y.

IN the presentation of the report of the Committee on Scientific Research, your chairman is inclined to emphasize one or two salient points in the history of our efforts to advance our information on the physiological and pathological study of the organ of mastication. This study has been directed, as previously stated, to one field—vast enough in its scope to attract to it all the efforts of the gentlemen particularly interested, but with little means at our command.

STUDIES ON THE CAUSE OF DENTAL CARIES.

In this work, as in all other scientific fields, we find critics, who take what little truth has been established, and elaborate upon it, and draw conclusions from a few experiments; but we must appreciate that this problem of ours, the cause of caries of the human teeth, has been studied for centuries by the pathologists—that it is not a local disease, but a condition incident to bodily states the complexity of which has never been explained.

To be sure, we think we have in our specialty commenced to appreciate some of nature's workings, viewed from another angle, that have escaped the minds of the physiologists and pathologists—whose attention has been directed to processes more complex because of their difficulty to study and because they are more prominent in the painful conditions that are met in everyday medical practice; and even in this department of medicine the percentage of pathologists is lamentably small. It is not given to every man to have the patience to determine the etiology of disease, but some one man properly equipped with fundamental education will be found to carry on this work after we assure him a compensation.

TECHNIQUE FOR SALIVARY ANALYSIS.

We have established a technique for salivary analysis which we know is not without fault, but is sufficiently accurate to form a basis for research work. We are constantly trying to improve this technique so as to make it a standard for the investigation of the pathological field, as those who have been laboring in this direction have appreciated that a uniform technique is most necessary, if we are to reap the value of others' criticism. Writers will frequently intro-

duce another reagent which carries with it its own problems, and disregard the requests of your committee to carry out their research work under a recognized method, and then parallel their findings with their new reagent!

THE PHENOL-PHTHALEIN INDICATOR.

It is not that we would recommend the narrowing of a man's procedure, but rather to multiply findings without too much technicality. For instance, considerable comment has been made in reference to the indicator, phenol-phthalein, in determining acid index—that it is unstable because it is sensitive to carbon dioxid. Even though it be proved to be sensitive to carbon dioxid, if the recommendations in the technique are carried out the specimen will be examined immediately in each instance, and the time of comparison will be a constant factor, and the CO_2 content will be estimated in the acid index. Acknowledging the necessity of correction, the report would add to our information, and will show, over long periods, modification beyond those caused by diet.

There is no objection to other indicators being used and more information acquired, but your committee cannot but urge adherence to a technique, even with its faults, if we are to make progress.

In pursuance of this line of thought, we have been working upon the relation between the CO_2 content in the saliva, and its acidity to phenol-phthalein, and its alkalinity to methyl-orange, with three or four indicators.

The suggestions as indicated in Prof. H. Carlton Smith's report a year ago, to the effect that the acidity of the saliva was largely due to its CO_2 content, caused us to investigate after his method of procedure; and after numerous experiments we adopted a change in his technique, so as to be able to precipitate and centrifuge excess barium salts, instead of reading our findings with comparison of the turbidity. The change in the technique will read as follows:

CO_2 DETERMINATION.

The apparatus consists of a potash bulb to remove CO_2 from the air drawn in; a round-bottom flask in which the saliva is boiled; a test tube condenser and drip-cup, an Erlenmeyer flask which contains the $Ba(OH)_2$ to react with the CO_2 in the saliva, and a suction pump.

It is first tested for leaks by turning on the suction pump and watching the bubbles come through water in the Erlenmeyer flask, while the rubber connections between flasks are each closed in turn.

Then the apparatus is freed from CO_2, and at the same time a final test for air-leaks is made. This is done by putting 10 cc. N/40 $Ba(OH)_2$ into the Erlenmeyer flask, from a buret or pipet, and 50 cc. recently boiled water added to the round-bottomed flask through the separatory funnel. The suction pump is started and the gas flame under the round-bottomed flask adjusted so that almost 50 cc. will distil over into the drip-cup in one-half hour after boiling commences. It must be watched when the water begins to boil, to be sure that the vapor pressure of the water is less than the suction. Otherwise back pressure in the flask would shoot the water back through the potash bulb, and once started it would act like a siphon. After half an hour the suction pump is disconnected from the Erlenmeyer flask, at the same time that the air is admitted to the apparatus through the separatory funnel to avoid back pressure anywhere.

The $Ba(OH)_2$ in the Erlenmeyer flask is then titrated with N/40 H_2SO_4, using phenol-phthalein as an indicator. If the apparatus is free from CO_2 and air-leaks, it will require exactly 10 cc. H_2SO_4 to titrate the 10 cc. $Ba(OH)_2$ used.

Then the drip-cup is emptied, another Erlenmeyer flask containing 10 cc. $Ba(OH)_2$ is put in place, the suction turned on, and 10 cc. saliva and 50 cc. recently boiled water

are added to the round-bottomed flask through the separatory funnel. The heating is continued for one-half hour after boiling commences, and then the Erlenmeyer is disconnected as before, and the excess $Ba(OH)_2$ is titrated.

The difference between this number of cc. of $Ba(OH)_2$ and H_2SO_4 equals the number of cc. of $Ba(OH)_2$ used up by the free CO_2 and the CO_2 from acid carbonates of 10 cc. saliva. This figure divided by 40 (N/40 $Ba(OH)_2$) is used, and, multiplied by 1000, it gives the parts CO_2 per thousand, which we call the CO_2 index.

Proceeding according to this technique, we examined numerous specimens for their free acid and combined acids with phenol-phthalein, then estimated accurately a quantity of carbon dioxid, reducing the figures to an index and subtracting the CO_2 index from the total acid. The findings of these investigations showed that there was a persistence of acidity after the carbon dioxid was accounted for.

Illustration of specimen three hours after breakfast from patient with no caries.

	Acid index.
Acidity to phenol-phthalein	5.5
" " aldehyd	2.0
Total	7.5
Carbon dioxid index	6.9
Acid index corrected	0.6
	Alkaline index.
Alkalinity to methyl-orange	13.0

Illustration of specimen three hours after breakfast from patient with extensive caries.

	Acid index.
Acidity to phenol-phthalein	12.
" " aldehyd	6.5
Total	18.5
Carbon dioxid index	6.75
Acid index corrected	11.75
	Alkaline index.
Alkalinity to methyl-orange	14.5

In a recent communication, Dr. H. Carlton Smith acknowledges that he has come to the same conclusion, viz, that the acidity exists in a large number of the specimens after the CO_2 correction. Examination of these specimens for alkalinity with methyl-orange as an indicator, and H_2SO_4 as a titrating medium, showed them to be alkaline in every instance, and we are shown by these differences that there are acid factors that are not accounted for by either of these indicators. The recording of these two findings, however, enables us to make a comparison which may have physiological value, and gives us some little idea of the metabolism of an individual system as regards its ability to produce carbon dioxid.

In all pathological examinations we have found an increased acid index both free and combined, with a lowered carbon dioxid content, and when the CO_2 content was not half of the acid finding, it would appear as a pathological specimen, indicating disturbed metabolism. If the CO_2 is higher than the free acids, it shows presence of acid carbonates. The number of investigations was not sufficient to establish this statement as a fact, as there are many other elements which may influence this finding; but we have at least satisfied ourselves that there are few salivary specimens that do not show acid findings, even after the CO_2 content has been quantitatively established.

To illustrate the point previously made in reference to the pathological conclusions, an examination was made of the specimen of a patient suffering with chronic Bright's disease of long standing, referred by Dr. G. R. Kuhn, chief of staff of St. Mary's Hospital, Brooklyn; and the following report on

these properties shows the highest figures ever found in the laboratory:

Patient—Mr. J. G. M.

	Acid index.
Acidity to phenol-phthalein	41.
" " aldehyd	13.
Total	54.
Carbon dioxid index	8.1
Acid index corrected	43.9
Enzymic index	0.168
Proteolytic ferment	0.
Centrifuged sediment	32 per cent.
Overstanding fluid	Clear.
Mucin in sediment	14.3 per cent.
Overstanding fluid	Opalescent.

This is but one case, but if a thousand cases would show similar findings within physiological limits, we could then report a truth.

THE VISCOSIMETER.

Prof. H. Carlton Smith, Harvard Dental School, department of chemistry, has developed a viscosimeter, as reported a year ago, and has made a series of investigations with his instrument. His report is as follows:

In regard to the request which you make, I shall be very glad to give you the results of my work on saliva with reference to the viscidity and enzymes. In fact, it happens to be along just these lines that I am working at present.

I find that in the majority of cases the viscosity should be taken on saliva from which the solid particles have been allowed to settle naturally. In other words, the use of the sieve recommended in my text-book, which I presume you have, is not a desirable method, as the character of the mucin is liable to be so changed that the degree of viscidity is less than actually exists in the saliva before filtering. If the saliva is received at such an hour as to prevent a natural settling of the sediment and subsequent viscosity test on the same day, it may be necessary to clear the saliva in the centrifugal machine. I do not know yet just how the centrifuge affects the character of mucin, but feel that it is less than the sieve.

I also find that it is undesirable to have any volume of liquid whatever in the tube at any point below the restricted point in the condenser, as it apparently makes a difference with the amount of atmospheric pressure on the surface of the saliva. The temperature must be very accurately maintained within one degree C. of some selected point. I am using 20° C. at present.

In regard to the apparatus: The CO_2 apparatus I constructed from a very large test tube, a small Soxhlet flask and ordinary glass tubing which I bent myself. For the viscosimeter I took some Eimer & Amend 10 cc. graduated pipets, carried them to a local glassblower together with a 10-inch Liebig condenser, and explained from the cut what I wanted, telling him that the constriction of the pipet must be such that I could read 5 cc. within the condenser, and that the constriction must at least be an inch above the water inlet, and it must be of such character that it would take 5 cc. of distilled water at least one-half minute to run through it. This he did in a very satisfactory manner.

The viscosimeter that I am using now takes just 35 seconds to discharge 5 cc. of distilled water at 20° C. I use a stop-watch for time, and paper bands to facilitate accurate reading.

The viscosity tests are satisfactory and consistent, taken by the apparatus previously described. The enzymic index has caused us considerable trouble. I do not feel that the test with starch paste is satisfactory for general work, and have spent some little time in trying to work out a method based on a determination of the sugar produced in a given time, but as yet have nothing that I want to talk about.

We have examined over one hundred samples of saliva, finding about 16 per cent. of the samples showing acidity. Of these only 4 per cent. come from cases marked as having good teeth. Of the viscosity tests only 47 were from samples accompanied by a description of the condition of the teeth. Of these, two cases reported as from mouths with good teeth have high viscosity; fifteen cases showing decay have high viscosity. On

the other hand, in ten cases of low viscosity the teeth are good; in nineteen cases of low viscosity the teeth show more or less decay.

These figures, as well as any I might give (and they all tell practically the same story), show that it is impossible to draw positive conclusions from any one factor determined by salivary analysis.

I feel that the lack of uniformity of methods must rather seriously retard the progress which is being made toward the positive interpretation of the results of salivary analysis.

(Prof.) H. Carlton Smith.

These findings seem to be conclusive on this subject, but I am sure I am voicing Dr. Smith's opinion when I state that he would prefer to have some other laboratory work through a similar series upon the same technique.

As chairman of the committee, I wish to officially thank Dr. H. Carlton Smith of Harvard University, and Dr. Russell W. Bunting of Michigan University, for the generous assistance which they have lent us in our undertakings; and if their example were followed by other universities of the country, our information would grow rapidly.

EFFECTS OF THIOCYANATES IN DISSOLVING GELATIN.

In order to determine the soluble effects of thiocyanates upon gelatin, a series of experiments was instituted by Constance E. Schradieck, pathologist, Brooklyn, N. Y., under a sterile technique, and established the fact that ammonia-sulfocyanates had no appreciable effect upon gelatins in solutions varying from 1:100 to 1:2000, which appears to be conclusive.

PRACTICAL APPLICATION OF THE TECHNIQUE ADVOCATED.

In order to practically illustrate the application of our technique in the study of pathological conditions, your chairman wishes to report a case from his own practice, observed for a period of three years, which resulted in a cure of chronic constipation:

Mr. C. P., twenty-four years of age, a college athlete and an electrical engineer, apparently was in good health until he became confined in office work, when he developed intestinal indigestion and a chronic constipation. He had been in the hands of several medical advisers, and Dr. T. P. Prout, pathologist, of New York City, had his case under observation during my treatment. All medication was eliminated. A quantitative analysis of his saliva was made which was as follows [exhibiting charts].

His urine and feces were examined by Dr. Felix Von Oefele, New York City, and were as follows [exhibiting charts].

An examination of his mouth showed a malocclusion, class I, mutilated by extraction, presenting 29 inclined planes in occlusion, representing 22 per cent. of normal.

After a year's orthodontic operation, returning the teeth to their normal inclination, Dr. Henry W. Gillett of New York City re-established the inclined planes with prosthetic pieces and gold inlays, developing 115 inclined planes in occlusion, which represented 85 per cent of normal, resulting in mechanical retention of the occlusion.

Examinations of the secretions and excretions were made at intervals, showing a gradual improvement, and comparisons were drawn June 23, 1912, which showed the functioning ability of his teeth improved 60 per cent.; ability to reduce starch to sugar in the mouth improved 66 per cent. The coefficient of non-utilized food in the feces showed an increase of 333 per cent., but was 3

points below normal owing to continued intestinal disturbance. The chronic constipation has entirely disappeared, and he has had no medication for a period of fifteen months.

The comparison of salivary analysis shows a marked difference in many properties and makes a very interesting study. The quantity secreted in a given time increased: Original analysis, 64 per cent. below normal; second year, 60 per cent. below normal; third year, 45 per cent. below normal. "Consistence" showed a more viscid condition, with the presence of mucin, while the original examination showed none. The ptyalin was markedly increased: Original, .010 index; second year, .085 index; third year, 2.3 index. The thiocyanates increased during the first year, but stood about the same as original at the time of the third record: Original, .0074 per cent.; second year, .0095 per cent.; third year, .0073 per cent. The chlorin decreased: Original, .0496 per cent.; second year, .03544 per cent.; third year, .0709 per cent. Centrifuged sediment: Original, 2.6 per cent.; second year, 5 per cent.; third year, 9.7 per cent. The total solids decreased. All these properties showed improvement, but the percentage of Esbach's albumin, and the increased quantity of total acidity and urea, were unfavorable on the second examination, but were accounted for in feces analysis by a greatly increased auto-intoxication, which was attributed to a change of diet and the lack of use of the restored organism, with the adherence to the habit of selecting soft carbohydrate food, and the fact that liquids were taken with meals. Acid change to phenol-phthalein: Original, 3 index; second, 4 index; third, 13 index. To phenol-phthalein aldehyd: Original, 7 index; second, 20 index; third, 5 index. Total acidity: Original, 10 index; second, 24 index; third, 18 index. The last specimen showed alkalinity to methyl orange, 31 index. Amino-acids as ammonia: Original, .012 per cent.; second, .340 per cent.; third, .85 per cent.

After the second examination the patient was recommended to select hard dry carbohydrates, to take no liquids with meals, and to increase his number of mastications per mouthful; and on June 30, 1913, a year later, another set of specimens was examined, which showed a constant improvement in all properties, and the following figures show the difference occurring between the original examinations and the completed one: Ability to reduce starch increased 229 per cent.; non-utilized food in the feces showed one point below normal; the original auto-intoxication improved 12½ per cent.; coefficient of fat-splitting increased from 37 : 100 to 50.3 : 100, normal being 52 : 100.

An examination of salivary specimen showed a total acidity of 18, a slight increase over original; amino-acids as ammonia increased; chlorin decreased, centrifuged sediment increased 7.4 per cent.; thiocyanates remained the same.

He has enjoyed excellent health since the work was completed; his constipation entirely disappeared. His countenance has become more alert, and his eyes more brilliant; the photographic record (see Figs. 1, 2, and 3) will prove these assertions. He is more ambitious for work, and is doing well in business in New York City.

His record would not be complete without the following report from Dr. Henry W. Gillett from the prosthetic standpoint:

FIG. 1.

FIG. 2.

FIG. 3.

Report on the Case of Mr. C. P.

The slides illustrating this case make sufficiently plain the prosthetic steps, so that detailed description is superfluous. The gold restorations are cast, and are mostly of 2½ per cent. platinized gold, and the porcelains are hand-carved for the case. At all points thoughtful attention was given to the establishment of conditions that should conduce to the maintenance of cleanliness, that should eliminate mechanical irritation, and that should permit of efficient masticatory movements and at the same time promote retention of the orthodontic results.

Fig. 4.

Fig. 6.

Fig. 5.

Fig. 7.

In reporting this case from the viewpoint of the general practitioner, I desire to depart a little from the usual routine, and speak of the underlying principles involved, of the possibilities of our work, and of the responsibilities our position entails, using this particular case as an illustration.

I realize that but a small percentage of cases of this type can receive such treatment as has been possible in this case, but I desire to lay strong emphasis on the responsibility of our profession for keeping such patients informed of the grave effects upon nutritional functions of inefficiency of the masticating organ, and to urge that the train of functional disturbances and organic lesions which must follow such inefficiency be forcefully presented to our *clientèle* at all reasonable times and as cogently as lies in the power of the individual operator. We have no right to pass by the opportunity of calling attention to the facts—of emphasizing the certainty that a material inefficiency of the initial nutritional organ is of as grave import as a similar inefficiency of any other single organ—be it heart, kidney, stomach, or liver—because it is likely to lay the foundation for disturbance in all these as well as other vital organs.

The portal of the digestive tract has been surrendered to our care, and in that portal the initial step of the complex nutritional

function is performed. This fact loads us with a serious responsibility. This responsibility imposes upon us the need for a more careful consideration of the masticating organ as a whole than it usually receives. It is my belief that we are too prone to focus on the individual elements of the organ, and to lose sight of their relation to its other parts, and to its efficiency as a unit.

In this case the patient first presented with a message from his father to the effect that he wanted to know whether the dentistry in his son's mouth was adequate, and those of you who have thoughtfully studied the slides showing the original conditions will realize that a comprehensive and satisfactory answer was not entirely easy. I realized that what the father had in mind was the kind of fillings that had been done, and their condition. I also realized that if I confined my reply to the question as he meant it, and failed to take up the graver inefficiency of the masticating organ as a whole, I might in the future meet with severe criticism—because the father was himself an engineer of capacity, with a keen appreciation of the value of an efficient organ.

Therefore my reply contained the statement that if the young man carried out his intention of taking up active professional life in New York City, with its attendant pressure and complexity, it must necessarily follow that he would break down physically before reaching middle life, and that he must look forward to a lowered efficiency for much of the period in which he might succeed in pursuing his practice.

In preparing the reply to the further question, as to the right remedy, I consulted Dr. Henry C. Ferris, and asked him to first analyze the situation from the orthodontic and physiological side, and tell me what assistance I might expect from orthodontic procedure. After considering his report on these two elements, I stated to the father that by combined orthodontic and prosthodontic measures we might reasonably expect to raise the efficiency of the masticating organ from below 10 per cent. of normal, where Dr. Ferris conservatively estimated it to stand, to at least 80 per cent. of normal, and to retain it permanently at that point.

In work of this type I hold that it is necessary to adhere to two fundamental principles—namely, that anatomical restoration of individual teeth is of first importance, and that it is correct surgery to replace with substitutes any and all teeth or parts of teeth that cannot otherwise be brought into harmony with the lines insuring an anatomical occlusion and its permanence.

I believe a study of the slides illustrating this individual case will convince you that the life prospects for this subject have been profoundly modified by the procedures put in practice; that from an original certainty of continued struggle with hampering disabilities, his outlook has been changed to one warranting the expectation of high efficiency, and confidence that he will go far in his chosen field.

With this case as an illustration, I submit for your consideration the statement that, as a profession, we should give more attention than we do to the efficiency of the masticating organ as a whole, and that we need to make a broader study of the possibilities in all mutilated malocclusion cases than has been our habit.

HENRY W. GILLETT, D.M.D.

CONCLUSIONS.

(1) In drawing conclusions upon our past work, we must acknowledge that it is impossible to make a correct diagnosis from any one factor in analysis unless it be the percentage of the ptyalin in the specimen.

(2) We have also proved that we must look farther to account for the acids found in the saliva. Whether they are produced by the action of bacteria upon the muco-proteins is one of the problems for future solution.

(3) Gelatin is not more soluble in solutions of sodium thiocyanate than in water out of the mouth; but what effects this property has upon the muco-proteins in the mouth remains to be proved.

(4) We have shown that, by comparison of analyses of the secretions and excretions before and after an improvement in the functioning ability of mas-

tication, we modify the whole organism, and thereby put our work on a scientific basis worthy of the consideration of the world.

In closing, we wish to say that while we have not been able to establish a great many truths, we have worked with a definite method of procedure, and our findings may be corrected or disputed—which means honest advance.

It is the sincere wish of your committee that this work continue under the new committee upon these broad lines, and not upon individual methods.

Respectfully submitted,

HENRY C. FERRIS, *Chairman.*

Orthodontia and Its Relation to Dentistry.

By ROSCOE A. DAY, D.D.S., San Francisco, Cal.

THE relationship of Orthodontia to general dentistry is such that it demands hearty co-operation upon the part of both the orthodontist and the general practitioner, and is of pronounced assistance to both in accomplishing the results desired. The orthodontist is in the same relation to dentistry as the rhinologist, aurist, and oculist is to medicine. Not that the orthodontist feels himself greater in his art, but simply that the time has arrived, in this advanced and progressive age, when the laity demand individual attention to themselves and families, especially in the proper care of the children from every point of vantage looking toward normal development of the human body.

IMPORTANCE OF ATTENTION TO OCCLUSAL CONDITIONS.

I believe I am not presuming too much in saying that there is not a person present here today, who follows his general practice closely and has his patients' welfare at heart, who feels that he can afford to give time to a case of malocclusion, or any character of malformation, without neglect of some other department in his practice. Thus is shown one of the reasons why the science of dentistry is being divided into its many departments, called "specialties." Another very important reason is that the laity are becoming educated to the facts, and are demanding that they receive the benefit of that "special education" that is necessary in order to fit the competent man to practice successfully his specialty and get results.

The position of the general practitioner of dentistry demands that he should be very familiar with orthodontia from its many standpoints. The family physician first takes the responsibility of the child from its conception, through the prenatal and postnatal period, up to the time of the presence of the full complement of the deciduous teeth. Then the family dentist comes in, and as a rule he is the first to come in contact with the patient who is in need of the services of the orthodontist. His advice is always asked regarding the development of the dental arches, the condition of the teeth, and especially the dental occlusion. It is of great importance that he be thoroughly familiar with normal occlusion and its relations—with the influences it exerts upon the development of the facial bones and proper muscular functions—so as to enable him

to diagnose the condition at once and offer the best judgment in regard to cases that come under his observation.

"NORMAL OCCLUSION" DEFINED.

It may seem rather superfluous to present to you the definition of "normal occlusion," given by Dr. Edward H. Angle, but I cannot resist doing so at this time, inasmuch as it covers so thoroughly the cases that come under the care of the dentist. It will assist materially in enabling him to diagnose those cases, while it implies as well the probable prognosis if they are not given proper attention.

He defines—"The line of occlusion as being the line in which, in form and position, according to type, the teeth must be in harmony if in normal occlusion."

There can be, then, but one line of occlusion, and it must be the same as the architectural line on which the dental apparatus was constructed. This ideal line was intended to govern not only the length, breadth, and peculiar curve of the dental arches, but the size and position of each tooth, cusp, and inclined plane composing these arches; and more than this, that as the dental apparatus is only a part of the great structure of the human body, each part and organ of which was fashioned according to lines of design, it must have been intended that the line of occlusion should be in harmony in form and position with, and in proper relation to, all other parts of the great structure, according to the inherited type of the individual.

Anyone giving this definition sufficient thought and study may apply it to cases that come within his observation, and can readily appreciate its broadness, and see how completely it covers the individual case at hand.

ETIOLOGY TO BE STUDIED.

An important factor in the majority of cases relates to the etiology, or causation, of malocclusion and abnormal development. The etiology of each case presented demands the most careful and thoughtful consideration, in order that the operator may be able to remove the cause, if possible, and prevent further abnormal development along the line of perverted normal occlusion.

The causes are numerous, and each one has its own individual characteristics in that regard. Those most commonly associated with malformations are nasal stenosis, brought about by adenoids, polypus, infected tonsils, some form of deviated septum, or irregularity of the turbinate bones, resulting in an underdeveloped nasal passage, lacking capacity for normal breathing. The natural result is the necessity, in the case of a patient so afflicted, of using the oral cavity for breathing purposes in conjunction with its other normal functions, and in the greater majority of cases creating an habitual mouth-breather, whose habit greatly retards the normal physical and mental development.

We know that the osseous development is greatly influenced by mechanical stimuli, whether of muscular function or otherwise. In the case of a mouth-breather, the abnormal functioning becomes greatly pronounced by the mouth being constantly held open in breathing, which creates abnormal muscular pressure against the lateral halves of the upper arch and a backward pull on the

mandible, with lack of the normal function of the tongue in assisting, as it does when in its normal position, in forming the arches.

Mal-locking of the cusps of the teeth as they erupt in their respective positions, and continual pounding of the mandible into the upper arch when the teeth are in malocclusion, also altered conditions of atmospheric pressure in the inspiration and expiration of air, are pronounced factors in the abnormal development of the bones of the face and accessory sinuses. Nature fully intended the nasal fossa to be used for breathing, and in so doing made provision for the air to be properly prepared and treated for its reception into the lungs; and when the oral cavity instead has to perform that function, the absence of the preparation of the inspired air results in the lack of full distribution throughout the lung cells; a continuation of such conditions greatly hinders the distribution of sufficient oxygen to the system, which tends to entail lack of development in the region of the chest and a general anemic condition of the patient as a whole.

MALNUTRITION AS A FACTOR IN ETIOLOGY.

Another mode of causation that presents itself very frequently is malnutrition, which may be traced as far back as the prenatal stage, namely, to the anemic or faulty assimilation of the mother.

In early infancy the child, in some cases, cannot be fed by natural means—the mother's milk—which necessitates artificial feeding; and many times the physician is not able to prescribe a formula that takes the place of the natural food—all of which necessarily retards the early development of the child. In some instances a too highly organized food is given—food lacking the proper ingredients for bone-building.

The eruption of both the deciduous and the permanent teeth is at a period when the greatest growth of the body is in progress, and if malnutrition or any other abnormal factor is present during this period, it is quite natural that it should seriously affect the normal development of the dental arches and interfere to a great extent with normal eruption of the teeth into the respective positions.

HABITS AND ENVIRONMENT.

Diseases acquired in early childhood and improper environment are influences which tend to deflect from normal development—as oral habits of various characters acquired in early childhood and not overcome before having become the cause of some pronounced abnormal functioning. The habit of mouth-breathing, acquired owing to some obstruction of the naso-pharynx, when it has been of long duration, is in many instances the one that is hardest to overcome. Thus, many times, after the rhinologist has removed the cause of the nasal stenosis, and the orthodontist has restored normal muscular function and normal occlusion of the dental arches, the patient, through lack of effort and long association with the habit, continues to breathe improperly—especially when fully relaxed, as in his sleep. This is not a common condition, but one due to a chronic condition of long-standing malformation, and must be overcome by mechanical assistance in closing the mouth while in repose.

Higher civilization is another great factor in causation, associated with disuse of the oral cavity, in lack of sufficient amount of natural exercise in mastication, owing to the fact that our food of today is so prepared that it is to a greater extent predigested before being served for consumption. It is proved, therefore, that the great factor behind these maldevelopments, in many instances, is perverted nutrition and the rearing of the child in a hothouse existence, as it were, with a lack of the proper amount of natural environment, in not being associated closely with nature as the Creator intended.

IMPORTANCE OF CARE OF THE DECIDUOUS TEETH.

One of the most material points, one that is frequently of the greatest significance for the future welfare of the patient in the matter of oral development, is the thorough and conscientious care of the deciduous teeth. This is of the utmost importance in its bearing on the normal development of the dental arches. Through the efforts of the dentist the parents are becoming more enlightened in that regard, and are much more appreciative of the necessity for the proper care of the deciduous teeth until their successors erupt; they are being educated to understand the very important part that the deciduous set play in assisting nature to insure a normal growth of the dental arches, and it is one of the essential duties of the dentist at all times to thoroughly impress this fact upon the parents.

FACTORS IN THE CAUSATION OF ABNORMALITY.

A causal factor that appears in some instances is a congenital anatomical deficiency, such as cleft or non-union of the suture of the superior maxillary bones, malformed or misshaped cusps and crowns of teeth, non-formation of the permanent tooth-germ to succeed its predecessor, the deciduous tooth. These causations, fortunately, are not common, but, when they occur, present a serious difficulty to overcome. Again, in some instances the phenomena of deficiency may be reversed, even to the extent of supernumerary teeth erupting inside the upper dental arch, disarranging the teeth as they erupt, and so bringing about a malocclusion.

The causes mentioned are general, and there are many instances, perhaps, where we may be able to trace the etiology to some other origin; and this emphasizes the necessity laid upon the dentist that he be so equipped with knowledge in relation to orthodontia as to enable him to diagnose the cases that present themselves. It is of the utmost importance that these abnormalities be recognized at or as near the beginning as possible—not waiting until they have developed to the chronic stage, so to speak, but taking them into consideration at once and giving relief through proper orthodontic procedure.

OBJECT OF ORTHODONTIA TO SECURE NATURE'S IDEAL.

The relationship and object of orthodontia in dentistry is purely to assist nature toward the normal functions of the oral cavity, normal development of the facial bones and dental arches, normal muscular functions and normal occlusion of the teeth—which, when established, maintains a balance of function that was originally intended by nature, and in consonance with the inherited type of the individual.

You are all fully aware of the results of a dental impaction of long standing, and the difficulty in trying to overcome a malformation that has gotten to such an extent of development that every function is practically abnormal; also the fact that many of the more pronounced cases of delayed development of children are influenced by dental impactions. This is a factor recognized by the science of medicine—especially by the man in that profession who is devoting himself to the care of children—and by the rhinologist as well. Nature's original intention is harmony of development and function in all parts of the human body as to its inherited type of the individual. She creates the size and form of the teeth in harmony with the bones of the face, and they are so constructed and arranged that they properly resist the natural forces when the teeth are in normal occlusion. Each bone of the skull bears a relationship to the others as to size, and the failure of one or more to gain its full size naturally affects the growth of the other bones that articulate with it; and when this change of bone-development takes place to such an extent that the erupting teeth are forced to take a position in occlusion other than normal, the perversion of bone-development immediately becomes further assisted by the exertion of the mechanical forces of occlusion, besides the creation of a perverted muscular function, upsetting the balance of expression of the facial features.

Other anatomical deformities of the human body, such as come under the care of the orthopedic surgeon, are given attention, as we know, at the earliest possible age, in order to place nature at her best advantage for a more perfect development of the parts afflicted. We, as dentists, have the same responsibility in regard to oral deformities and malformations, and beg to suggest for your consideration whether it be not more logical and practical that the dentist should recognize these abnormalities at the earliest age possible and assist nature toward realizing her original intention of development in the case of each individual.

You cannot but agree that it is of the utmost satisfaction to the dentist, and as well to the patient, to realize at maturity a normal development and balance of function of the oral cavity and its affiliations. It is, as well, of great assistance to the dentist in the future upkeep of the organs of mastication. The creation of and the skill in the adaptation of appliances for use in the cases at hand are essential, and need to be thoroughly understood, but, even so, these become of no material value to the operator unless, further, he be able to proceed on a scientific orthodontic basis from the beginning to the completion of each case treated, and be thoroughly familiar with the laws governing normal occlusion.

Discussion.

Dr. Horace L. Howe, Boston, Mass. In discussing this most interesting paper, I will say that I heartily agree with the general sentiment expressed by Dr. Day. One succeeds best in those fields of work he likes best. The practice of dentistry today is so complicated that to follow all branches with equal enthusiasm is well-nigh impossible—therefore the development of the specialty of orthodontia.

To best serve the public it is necessary for us, who sometimes stand as ad-

visers, to be thoroughly alive to the importance of normal functioning of the jaws and of the nose. The longer I study malocclusion, the stronger is my belief that most of its causes may be traced, directly and indirectly, to the too little use of the jaws and nose. The jaws were designed for USE. Recently a strong, handsome, splendidly developed

FIG. 1.

Swedish gentleman came to my office for treatment. Every tooth was perfect. The jaws were large and well-developed. Only four or five small fillings were present. I remarked that he must have used his teeth when young. In reply he told me that his people in Sweden considered bread unfit for food if less than three weeks old.

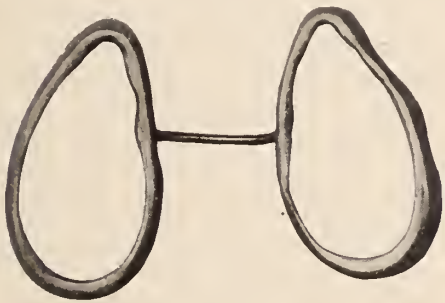
There is no doubt that the use of the jaws in vigorous mastication is the source of stimulation toward their development and the source of the preservation of the teeth after they erupt. The jaws will not develop without the blood supply, which is, in turn, dependent on the stimulation of exercise. One of the most pitiful objects I ever beheld was a boy of perhaps fifteen, whose lower jaw was of the size of that of a child of six. (Fig. 1.) What caused this condition? I *know* it was due to *lack of use*. Of this I am positive, because the boy had ankylosis of the jaw from childhood. His jaw lacked the stimulation of use.

Just a word regarding the importance of the nose: Dr. Day points out that in many cases of malocclusion where mouth-breathing is associated, even after the efforts of the rhinologist in removing the adenoids and polypi, and those of the orthodontist, the nose will still be unused. This, indeed, is the case. The nose, having remained unused perhaps for many years, lacks its proper development. The stream of air passing in and out of the nose under positive and negative pressure is an immense developing force. When we inhale vigorously through the nose, the whole internal head is ventilated, the accessory sinuses are cleared, the air is dragged from the frontal sinuses, the internal ears are ventilated through the Eustachian tubes. To demonstrate this fact one has only to breathe vigorously through the nose, especially in cold weather. Again, when the air is exhaled through the nose, a positive pressure is exerted, which sends the air forcibly through all these passages. Thus it goes back and forth, ventilating and clearing and developing the whole head.

Imagine the loss when the nose is not used. The stream of air when carried to the lungs through the mouth, besides losing the filtering and warming effect of the nose, does not become the devel-

oping and ventilating force I have described. Imagine what this loss means to a developing child! Is it any wonder that many cases persist in mouth-breathing even after our combined efforts? We need to take advantage of every possible factor for the establishing of the normal use of the nose. In many cases, the patient should wear the intermaxillary elastics for a long time after the correction of the malocclusion, simply to cause the closing of the jaws when the muscles are relaxed during sleep.

Fig. 2.



In connection with this subject, I wish to speak of a nasal dilator which I think will be an aid to establishing normal breathing. This is designed to be worn at night—when, as we all know, because of the increased blood pressure with the body in recumbent position, the passages of the nose are smaller than when the upright position is maintained. The dilator (see Fig. 2) holds the soft parts of the nose away from the turbinate bones and septum, allowing much freer passage of the stream of air. In many cases it is a physical impossibility for a child to draw the proper amount of air through the nose. I hope this mechanical dilator will prove as useful as it promises to be.

In conclusion I would once more emphasize the importance of normal functioning of the jaws and the nose.

Dr. V. H. Jackson, New York. This is a very important paper, and I should like to have had time to read it carefully before taking part in the discussion.

Dr. Howe's introduction of this expander for the alæ of the nose is important. There is erectile tissue in the nose and in severe changes of weather this tissue becomes active and closes the nostrils, compelling the individual to breathe through the mouth. At night also, very often, this tissue becomes active, and it is of great benefit to the patient to have this apparatus hold the alæ of the nose in position while sleeping; it is very important for the growing child—in fact, for persons of any age. The nose does not develop normally unless functioning properly, and unless it is functioning properly the turbinates become overdeveloped.

Lack of development of the arches is due in many cases to constitutional conditions, and that brings us to heredity. I am a believer in heredity, but I think that some are not holding to that view as strongly as they should. It is very important that we should take these children in hand at the earliest possible opportunity and watch the development of the arches during the developmental stage. I have models of the mouths of children of four years of age in which I am expanding the arches, and every one shows a condition of distal occlusion, the lower arch being retruded and both arches developing according to these conditions.

The essayist's paper shows clearly the relationship between the practitioner and the orthodontist, and I was much pleased to hear him say that the general

practitioner should be posted sufficiently in orthodontia matters to be able to advise parents in regard to their children. Every practitioner should be almost obliged to pass an examination on these matters, because, if we are going to be practitioners and advise mothers regarding their children, we need to understand all phases of the etiology of malocclusion and be able to advise the mother in the right way. I often tell patients, when they think me a little over-anxious to get these children under treatment, that they would not set a plant in a front yard and let it grow by itself, but would watch it and care for it and see that it was not strangled by weeds. We need to take charge of these children and direct the development of their arches and faces so that we may bring about what nature intended, by improving the groundwork or bony processes that will produce and support perfect arches and normal occlusion of the teeth.

The general practitioner is the man who must advise the parents as to whether a child shall go to an orthodontist, or whether he himself is to take care of it—and he should not interfere unless he can help the child by doing the best that can be done. That means that every practitioner should be thoroughly posted and be able to give the parents the best advice obtainable. Many practitioners are not following this method; often they attempt treatment of these cases although they do not understand the true requisites to bring about the proper shape of the arches.

I was pleased to hear the essayist's paper, which is calculated to bring out the best that is in us—and that is what we are working for.

Dr. F. C. Rodgers, St. Louis, Mo. I wish to compliment Dr. Day on his splendid paper. It has special importance at this time, when the subject of preventive treatment both in medicine and dentistry is rife throughout the country. Dr. Day has incorporated in his paper the basic principles of pathologic causes of malocclusion of the teeth, and has also pointed out the responsibility of the dentist in directing the development of the teeth and calling the attention of the parents to the necessity of having the malformations corrected at the earliest stage. If the interest of the general practitioner could be aroused to the point where all would work in harmony and with the object in view of preventing these distortions of the mouth and face that we see every day, and that are caused by maldevelopment of the teeth, there would be no need of the orthodontia specialist. These deformities are preventable in their early stages by very simple treatment; therefore the advice of the dentist is important. The general practitioner should guard against the development of malformation, and thus we should be doing a great service to humanity. Not only do irregularities of the teeth cause malformation of the jaws, but the relationship of the nose and the entire contour of the face is also affected.

This is a serious problem, and it should receive closer attention from the profession than I believe it has been given in the past.

Dr. Howe. In connection with the essayist's paper, I want to speak of the work which Dr. Baker of Boston has been doing in showing the influence of mastication upon the skull. Dr. Baker took a group of young rabbits and removed the teeth from one side of the

jaw to see what influence this would have upon the development of the rabbits. Perhaps some of you have seen the record of these experiments, and I mention them now simply to call your attention to them. After these rabbits had grown up, he compared their skulls with the skulls of rabbits that had developed normally, and the comparison was very marked. The median line was deviated toward the side which was used in mastication. The nasal fossa on the side used was larger than on the other side. The backbones of the rabbits were twisted, and the pharynges were also twisted. A German investigator connected with the University of Berlin also performed similar experiments with dogs, in order to show the influence on the development of that animal, and these experiments were even more marked in their results. I simply mention these experiments as being in line with Dr. Day's paper.

Dr. W. E. Grant, Louisville, Ky. I wish to say that I believe the greatest good the men who are working in the field of orthodontia can possibly do at this time is to inaugurate a campaign of education that will result in intelligent and enthusiastic work on the part of the general practitioner along the line of corrective measures. The general practitioner seems to have overlooked the fact that he has a professional duty to perform in this direction, and we all know that many good men are failing to do their professional duty in rendering service to young patients that come under their observation. This is true of practitioners in the larger cities, but especially of those in the smaller cities who do not have the opportunity to refer cases to the specialist; they do not think it is necessary for the patient to be under the care of a specialist at that time. In other words, the general practitioner in many cases believes in playing the waiting game; he believes that, after the child is twelve or fifteen years of age, there will be time enough —when, as a matter of fact, corrective measures should be applied earlier in life. In my localities I have endeavored through clinics and papers to show the necessity of the general practitioner taking up this work and being able to give intelligent advice to parents in the care of such cases by the orthodontia specialist.

Dr. Grafton Munroe, Springfield, Ill. It gives me much pleasure to voice my sentiments in regard to the excellence of this paper. Dr. Day has given us a paper worth the consideration of every orthodontist and practitioner of general dentistry. One of the most important developmental phenomena that engage my attention relates to the muscles of the child—of which, with reference to the mouth and nose, Dr. Howe has spoken. We know that the smallest children are actively engaging their muscles when obtaining their natural food. The child who is artificially nourished is not developing the muscles of the head, nose, throat, and cheeks as he should; when, however, the child is nursed by the mother, a more active development of the muscles takes place, and all the muscles of the head act, aiding the development of the bones of the head, consequently the nasal apparatus is better developed. As a general practitioner and not having engaged in the practice of orthodontia except in a limited way, I have found that a very important item to be considered is the appearance of approximal caries. As soon as approximal caries commences in

the deciduous teeth, they will be noticed to fall out of their normal positions, and if the first permanent molar erupts against a carious or broken-down deciduous molar it will be tilted out of its normal position and occlusion. Of course, as orthodontists we all appreciate the fact that the first permanent molar is the keystone and guide of the whole arch, and if that is tilted out of position we shall have a disarrangement of the whole arch. Special attention should therefore be given to the appearance of approximal caries, and by taking care of the deciduous teeth we shall in a great degree prevent malocclusion.

Dr. J. V. Boswell, Springfield, Mo. After ten years of work in orthodontia I am convinced that we have only scratched the surface, and that, considered in several aspects, it is of more importance than we have often thought. Considered from the standpoint of the dietetist, it is almost impossible thoroughly to masticate or insalivate food without normal occlusion; while from the standpoint of the practitioner who is only filling teeth, we know that teeth in their proper alignment are less susceptible to caries, because there is a more normal contact and the interproximal spaces are more normal, thereby preventing food from lodging, fermenting, and causing caries. There can be no doubt that a great amount of irregularity is caused by lack of stimulation. We are living in a "spoon age," when people are accustomed to eat foods that can be eaten with a spoon and require no mastication. If I have studied correctly the investigations on the teeth of prehistoric peoples, I understand that by comparison the size of the crowns and roots differed from what it is today. Our teeth are set in the bones weakly; small roots and large crowns are the result of eating foods that require no great amount of mastication and promote no great amount of stimulation, whereas in past times the roots were larger as compared with the size of the crown.

One of the greatest troubles that the general practitioner has had in the past was that he did not seem to see these evils until they were fully developed. It was easy to see where teeth were missing, and where a bridge could be placed, or where teeth were decayed and needed filling; but apparently he did not see malpositions until they had made considerable progress. I had one dentist tell me, not a great while ago, that he never had a case for orthodontia presented to him. I believe it was because he was not a good diagnostician, and could not see the evil progressing. This feature should be considered carefully, for it is here that we owe our greatest duty to our patients.

Dr. H. A. Elmquist, Des Moines, Iowa. It seems that the early etiology of irregularities is the most important field of dentistry, and yet these irregularities date back farther than the time when the general practitioner of dentistry comes in touch with them. Here medical men and dentists should come closer together; the medical man is the one to see these conditions first, as we do not often see the patients until the damage has really been done. We often do not see children until they are eight, ten, or twelve years of age, when they have lost their deciduous teeth without having been taken to the dentist. Often the first permanent molar is already decayed to the point where it is giving trouble, and then the damage has been done by interference with the development of the jaw. The medi-

cal man, therefore, who comes in touch with these patients sooner than we do, is the one who should recognize these conditions, and he should send the patients to the dentist.

Dr. L. M. Waugh, Buffalo, N. Y. It is with a good deal of hesitancy that I rise to take part in this discussion, as I take it for granted that thus far the subject has been discussed only by men who are actively engaged in orthodontia, while those engaged in general practice have not yet voiced their sentiments in the matter. I have enjoyed this paper more, perhaps, than others which have been offered by orthodontists to the general practitioner for his enlightenment, because the essayist goes to the basic principles of his subject and does not obscure them with illustrations of failures which have resulted from the mistakes of the general practitioner. The points brought out leave in our minds a most vivid impression of the harm that comes when steps are not taken for the early establishment of normal occlusion. As a general practitioner who is paying a good deal of attention to prosthetic procedures, I believe that the prosthetist is recognizing more fully the necessity for observing the principles of normal occlusion than any other branch of dentistry excepting orthodontia. The sooner all the branches of dentistry, special or general, recognize the fact that normal occlusion is the ideal for every operative procedure, the better it will be for the profession. This principle is applicable from the time the deciduous teeth are erupted, all through life and in every part of our work, no matter what restorations are done, down to the senile stage when the teeth are replaced with artificial dentures. When we restore an occlusal surface with a filling, we should have the ideal of normal occlusion in our minds; when we make crowns, normal occlusion is the mark at which we should aim; when we make bridges or artificial dentures, normal occlusion is the standard toward which we must work. The orthodontist steps in to aid the practitioner in establishing normal occlusion when the general practitioner is unable, under the stress of the busy day, to give proper time to such work; and if normal occlusion is established, the patient retains the teeth and the face is developed normally. After the orthodontist has established the nearest possible approach to the ideal of normal occlusion, it is our duty to see that this normal occlusion is maintained in everything we do—in building contacts, in restoring occlusal surfaces, and in the making of crowns and bridges. The establishment and maintenance of normal occlusion, reinforced by oral prophylaxis, which is now being so extensively exploited, is the ideal toward which as general practitioners we should work.

Dr. Gustavus North, Cedar Rapids, Iowa. To me it is apparent that the greatest causes of irregularities of the teeth are mouth-breathing and thumb-sucking during childhood. Mouth-breathing is generally caused by nasal obstruction, and we as dentists ought always to advise that such children be taken to a specialist for treatment. Thumb-sucking is a habit in infancy, and this habit is often encouraged by the mother and the nurse.

Dr. G. R. Hodge, Kansas City, Mo. There is no doubt that the orthodontist is of great assistance to the general practitioner and his patient. We should be able to direct patients to the right place, either to the orthodontist or the rhinologist, if the case cannot be treated in

general practice. The time has come when we should be able to educate the public along this line. These children can be benefited if rightly directed. Thousands of children are hard of hearing today on account of nasal troubles and enlarged tonsils. The education of the public along these lines would bring about grand results, and probably quicker results than can be obtained in any other way. Every day we see cases in which children would be benefited through life if their parents were properly instructed. In the case of my own child, who was a mouth-breather, I have seen the good results to be obtained from proper treatment. A few years ago I brought him to Kansas City and had adenoids removed from his throat, and in two weeks I saw a marked change. I think it is our duty to try to educate the public along this line by any means we can, and I am sure that it will prove of great benefit to the coming generations.

Dr. Day (closing the discussion). I first want to thank you all for the kind criticism accorded my paper. It is really a pleasure to see how much you appreciate normal occlusion, and it is very flattering indeed to know that you have accepted the paper in the way that it was intended. I have tried to make it as broad as possible, and my object in reading it was to benefit all.

One or two points have been brought out that I wish to speak about. One was preventive dentistry; and here I may say that the one object of early treatment in orthodontia is prevention. In the locality where I established myself as a specialist I have had many headaches over the fact that I had predecessors whose practice it was to advise waiting until children were fifteen years and older before any treatment was begun. That, I think, is the greatest mistake we could make. The one thing to do is to be candid and recognize these conditions and advise corrective treatment early.

Last year I had the pleasure of going to a wild portion of Oregon where there is a settlement of Indians numbering some fifteen hundred, and while there I had the privilege of examining the teeth of many of these people and studying their habits. Among them I found some very intelligent men who—I want to emphasize this fact—believed in living the simple life, and lived upon coarse foods. The government gives them one hundred and sixty acres of land each, and food of the coarsest variety, and it was astounding to me that among these fifteen hundred people I did not see a case of malocclusion—not one!

As a matter of comparison I want to call your attention to another fact. Our state board of prison directors appointed a committee to examine the prisons in the state with a view to establishing a dental department to care for the teeth of the inmates. We have a state administration that is doing all in its power to assist the community at large, and they even continue their efforts after men are placed in prison. I went to the prison for the purpose of examining these men and making recommendations to the directors as to what would be necessary for the establishment of a dental chair in the prisons. It may sound narrow, but, after examining 1115 men, I was convinced that malformations and irregularities of the teeth had a great deal to do with the mental state of these people. One man had been condemned to die and had been reprieved a number

of times, and just before I left I received two or three invitations to his hanging—which I hardly think will come off, because we are trying in California to do away with capital punishment. This man was sent to prison for life, and while there he killed three other prisoners; and he has a malocclusion of class III, the worst case I ever saw. His upper jaw is entirely inclosed within the mandible, with not one tooth in occlusion. Now, no one can convince me that this condition has not had its influence in the development of the man's brain and face. I saw many other cases of the worst types of malocclusion, and I am convinced that these conditions have their effect upon the mental development.

Someone spoke of the examination of children in the public schools. That is a great thing, but unfortunately the examiners' positions have gotten into politics, as in a certain city which I visited not a great while ago where I saw examiners at work who did not recognize irregularities of the teeth or malformations, but only saw cavities in the teeth. In the normal development of the mentality of the child these factors must be considered, because the mechanical forces of occlusion have everything to do with the facial bones and with cranial development.

SECTION I:

Prosthetic Dentistry, Crown and Bridge Work, Orthodontia, Metallurgy, Chemistry, and Allied Subjects.

Chairman—HARRY E. KELSEY, Baltimore, Md.
Vice-chairman—FRANK T. TAYLOR, Boston, Mass.
Secretary—J. H. WALLACE, Omaha, Neb.

WEDNESDAY—First Session.

The first meeting of Section I was called to order on Wednesday morning, july 9th, at 10 o'clock, by the chairman, Dr. Harry E. Kelsey, Baltimore, Md.

The first item on the program, as announced by the Chairman, was the reading of a paper by Dr. PERCY R. HOWE, Boston, Mass., entitled "The Saliva," as follows:

The Saliva.

By PERCY R. HOWE, A.B., D.D S., Boston, Mass.

THE most important problem now before the dental profession is to determine what differences exist between the saliva of mouths in which microbic life extensively flourishes and the saliva of those in which it is inhibited.

This is not a simple task, but involves broad and complicated physiological and pathological questions. The search in the saliva for a specific agent for or against dental caries has not been successful. We must, then, examine critically the fundamental principles of growth, nutrition, and disease, which the vast work of physiological research is making more and more clear to us; and we must try to establish, bit by bit, the connection between these principles and the local action of tooth decay.

VARIATIONS IN SALIVARY REACTION.

Analysis shows that the saliva from a resting gland differs from that flowing under a stimulus. The saliva from the resting gland is frequently acid, that under a stimulus alkaline, the degree of alkalinity depending on the degree of stimulation. Pain causes a very alkaline reaction. Analysis also shows that under the same stimulation saliva differs in different persons. The saliva is, then, individual in character; and it is reasonable to infer that that which accompanies rapid and extensive decay differs in some respects from that which is not associated with that pathological condition.

This may be readily demonstrated by experimentation. Collect from the parotid gland of several subjects one or two cubic centimeters of saliva, using every precaution against contamination from extraneous material, using in each case the same stimulant to incite the flow. Prepare a solution of sugar or starch. Then by means of a pipet add 1 cc. of one of the salivas to 2 cc. of the sugar or starch solution, incubate, and test for the amount of acid formed as described below. It will be found that the amount of acid differs in each case. In one it is twice what it is in another; in still another it is three times as much. The bacteriologist would attribute such differences to the number and kind of bacteria present. These play an important part in such an action, but are not the complete explanation, for activity of growth and virulence must be taken into account fully as much. If we subject the salivas to analysis, it will be found that they show wide analytical differences, so that we may feel that this difference in bactericidal activity or virulence is to be thus accounted for.

EXPERIMENTS IN VARYING THE CHEMICAL ELEMENTS OF SALIVA.

In order to arrive at a conception of the possible character of a saliva favorable for the proliferation of bacteria of the type that we believe to be concerned with tooth decay, I have carried out a series of experiments in which certain elements of the saliva have been artificially increased, and the effect on bacterial growth compared with controls. The bacteriology of dental caries, as worked out by Dr. Miller now more than twenty years ago, has received no material change, and we still believe this process to be due to lactic acid-forming organisms. On this basis I have determined the comparative activity of these organisms by estimating the lactic acid formed. The estimation has been carried out in the usual manner by titrations with phenol-phthalein for an indicator and with N/100 NaOH. Although the exact composition of the saliva has not been so completely determined as to have an established formula (I have carried out some rather complete analyses and balances that I will report later), yet for the present purpose it is sufficient to mention as elements albumin and globulin, mucin, phosphates, carbonates, chlorids, and the bases calcium and magnesium, sodium and potassium. These elements I have added to cultures of maltose, lactose, dextrose, and levulose; and have determined the lactic acid formed in the different cultures under exactly the same conditions.

STIMULANTS AND DETERRENTS OF LACTIC ACID FORMATION.

These experiments, comprising some five hundred tests, show that in every case the phosphates of the alkali bases are decided stimulants of lactic acid formation. They act here as in alcoholic fermentation.(1) Here and there throughout physiological experimentation it has been remarked that sodium phosphate, both the mono- and the dibasic, excites bacterial cultures to growth, and that it promotes cell growth. This property is not confined to the sodium phosphates, but is common to the phosphates of the other alkali bases. The phosphates of the alkaline earths act in the same way, but, on account of the solubility difficulties, are not so markedly shown. An increase of albumin and mucin, each of which I have added to cultures of the type described, produced a marked increase in the lactic formation as compared with controls. Creatinin causes a similar increase.

If it be true that with the picric acid test no other substance forms the distinguishing color,(2) then creatinin is a constituent of the saliva. On account of the colloidal nature of the saliva it requires a little time for the color to appear. Weyl's test and Salkowski's also give a positive reaction. Creatinin, as is well known, is a product of muscular (endogenous) metabolism, and it may here be accounted a stimulating agent.

The carbonates, bicarbonates, and chlorids diminish lactic fermentation, according to these experiments.

PROBABLE EXPLANATION OF PHENOMENA.

When we consider all these elements of the saliva from the standpoint of furnishing bacterial life with its nutritional requirements, we have a very reasonable explanation of their respective actions in these experiments as excitants or depressants. The globulin, albumin, mucin, and creatinin are all able to furnish the nitrogen for the structural requirements of the bacteria. Bacteria are selective, and with utilizable sugar present, even pathological germs form simply lactic acid, yet they must have nitrogen for their own structural purposes. Dr. Kendall is authority for the statement that the typhoid bacillus grown in broth forms toxins, but, when utilizable sugar is added, it forms lactic acid. In the first instance the smallest amount injected into a guinea-pig produces toxic symptoms, but in the second almost any amount can be injected with no ill effects. The organisms that attack the teeth must find not only suitable carbohydrate material, but also some material from which to obtain the nitrogen upon which their very existence depends. Under the conditions provocative of tooth decay even pathogenic bacteria become lactic-forming, and indeed the very growth that in the mouth causes such damage is, farther on in the digestive tract, considered a very desirable thing. Metchnikoff has advocated the introduction of lactic-forming bacteria for the purpose of changing the toxic character of intestinal putrefaction. Others to effect the same end have advocated furnishing the microbic flora with a suitable medium by feeding some utilizable sugar.

Certain bacteria cannot be grown *in vitro* unless they have amino-acids.(3) These acids furnish a nutritional requirement. They are of course obtained from albumins, either by the action of

a ferment or by proteolytic bacteria. From this we may feel that when the albumin or the globulin of the parotid or the mucin of the submaxillary saliva becomes subjected to the action of the proteolytic bacteria (and these exist in quantity in the mouth),([4]) the lactic bacteria would here find a very available source of nitrogen, and that it would stimulate these organisms to active growth. I have experimentally found this to be so; and by adding amino-acids to cultures have found the lactic acid production to be indeed increased.

PATHOLOGIC CONDITIONS AS FAVORING LACTIC ACID FORMATION.

Local infective processes of the gums, tonsils, sinuses, and nasal passages, adenoids and inflammations of the pillars of the fauces and of the uvula, or catarrhal conditions in which the colloids of the mouth show evidence of alteration or liquefaction by bacteria, are distinct aids to the lactic-forming organisms through affording an available source of nitrogen. I have shown this to be so *in vitro*. The albumin and the globulin are the better source of nitrogen as compared with the glycoproteid mucin, for mucin is comparatively poor in nitrogen. Viscidity of the saliva does not always signify a favorable medium for bacterial proliferation *per se;* viscidity of the parotid usually does. In cultures such as I have described the parotid saliva produces more acid than the submaxillary or the sublingual saliva. Compare the decay of the first molars with the decay of the lower front teeth.

Urea is frequently found in the saliva, and acts in the same way. Amino-acids are converted into it.

PHOSPHATES AND CARBONATES.

When we recall that bacteria of the kind associated with tooth decay are low forms of vegetable life, we know that phosphates meet nutritional requirements; and this may be considered a possible explanation of their stimulating action in lactic fermentation.

Although chlorids are essential to or are tolerated by certain kinds of bacteria, they here act in an inhibitory manner; and the same is true with the carbonates. Nor can we see, with our present knowledge of bacterial life, how they could be of service from a nutritional point of view. While I have termed the carbonates inhibiting substances, their action is to neutralize the lactic acid formed. Bacteria are able to form this acid in the presence of carbonates, as may be seen by a comparison of the degree of alkalinity in a control with that in a culture of some hours' incubation. Here the alkalinity will be found much lessened owing to some of it being used to satisfy the acid formed.

BALANCE OF ELEMENTS IN THE SECRETIONS.

Physiological chemistry has shown that under normal conditions the secretions of the body maintain a certain proportion or balance of many of those very elements which we have been discussing. The albumin and the globulin sustain a rather definite ratio to each other. The amount of sodium relative to the potassium, and of the calcium to the magnesium, are other ratios. Individual in character this balance may be, but under certain pathological conditions it is materially changed. The proportion of albumin to globulin, for

example, in certain kidney disturbances is changed so that the globulin greatly exceeds the albumin([5]); while in tubercular conditions the albumin much exceeds the globulin. In pneumonia is to be seen another example of this, for here the sodium-potassium relation is reversed from what it normally is,([6]) and the calcium-magnesium relation undergoes great alteration. The sodium, chlorin, and calcium are here retained, whereas the potassium and the magnesium are excreted in excess.([7]) It has been shown, too, that in the intestinal disturbances of infantilism similar irregularities occur.([7]) Calcium is here not taken up by the tissues.([7]) In one case reported, a normal urine contained a calcium-magnesium proportion of 244:100, when in the abnormal case the ratio was 27:100. In intestinal crises 60 per cent. more calcium is excreted than is taken in by food. These few cases serve to illustrate the fact that these very salivary constituents suffer disarrangement under certain systemic metabolic conditions, so that one element unnaturally predominates over the other. The saliva is no exception to the other secretions in the feature of having a balance of elements, as is known to every investigator of the subject. The chlorid-retention of fevers holds true in respect to the saliva. Under normal conditions the phosphates are increased by a heavy protein diet. Excess of the earthy phosphates in the urine is indicative of a heavy phosphate content in the saliva.

The chlorids remain usually constant, ([8]) but show increase by introduction through food supply. There is, however, a heavy demand for sodium chlorid in the system, for it is supposed to furnish the sodium base for all sodium salts in the body. It appears in the blood in connection with potassium phosphate, and a certain portion of it is taken up in a double decomposition forming sodium phosphate and potassium chlorid. On account of the large amounts of potassium salts present in vegetables, the individuals living on such a diet need more chlorids. The deficiency of chlorids in the saliva allows the mucin of the submaxillary saliva to become precipitated by the organic acids of the mouth.([9]) Drinking a large amount of water will cause an increase in the chlorids in the saliva.([11]) From many analyses I believe that in mouths where extensive caries is progressing it will be found that the chlorid content of the saliva is low. The administration of diuretics lessens the chlorid content. The chlorids under normal conditions maintain an isotonic relation in the tissues and in the bodily fluids.

Carbonates represent the ingestion and ultimate oxidation of carbohydrate material. Fatty acids given in the form of salts of sodium cause large quantities of carbonates in the urine: Schotten.([10])

A FIELD FOR INVESTIGATION WORK: LATER CONTRIBUTIONS—PICKERILL'S WORK.

These few facts serve to show some of the possible ways in which these elements of the saliva are disturbed in their arrangement, and in what way we may expect to increase or to diminish them. This clearly shows, as well, the immense amount of investigation work that needs to be done in order to clear up the connection between dental caries and the various systemic phases that

effect such alterations in the habitat of the micro-organisms as to cause them to take on an active growth.

This manner of consideration of the subject of tooth decay is based on the supposition that an abundance of utilizable carbohydrate is always available from the food supply.

A thick, viscid saliva can be thinned out and the chlorid content raised by drinking a liter of water with the meals according to the experiments of Mathill and Hawk,([11]) and as I have ascertained by actual measurement, using a viscosimeter described by me in the *Cosmos* for April 1912 (page 431).

With respect to the effects of stimulation of the salivary glands, Dr. Pickerill's interesting and instructive work shows that acid and sapid foods produce the greatest flow and cause the greatest degree of alkalinity.([12]) He advocates the use of such sapid substances for this purpose, and for the same reason he recommends acid mouth-washes and the incorporation of potassium bitartrate into powders. He attributes (and rightly) the greater degree of alkalinity to the larger amount of alkaline salts present, believing that the activity of bacteria is in no wise interfered with, and that they still have every facility for the formation of lactic acid, but that the presence of these alkaline salts in the salivary fluids will satisfy this acid, and that they will be chosen rather than the salts of the teeth. This idea of alkaline salts to neutralize acidity has been our usual treatment. Dr. Pickerill obtains a more constant presence of these salts. In respect to phosphates, he believes them to be protective agents for the reason that they may satisfy an acid. My experiments have convinced me that they are a nutritional stimulant to these organisms. Dr. Pickerill feels that mucin is a protective agent because it gives an alkaline reaction when it decomposes. I believe that it is a protective agent from a physical standpoint, but that its decomposition encourages a vigorous growth of lactic-forming bacteria by affording the necessary nitrogen, and that it is then converted into an augmenting factor. This I have substantiated by experiment. It is undoubtedly true that organic acids have their place in our armamentarium, yet I feel that the neutral and alkaline salts also have theirs.

The increased alkalinity arising from stimulation is of course due to the increased flow of blood that ensues upon the activity of the gland. The reaction of a resting gland may be acid, but when the gland is activated the reaction becomes alkaline. The degree as given by indicators is only relative. Dr. Pickerill has used methyl-orange, but it is not considered a very sensitive indicator—indeed Sutton says it is unfit for organic work. I have used methyl-red, which was recommended to me by the Industrial Institute of Chemical Research at Washington. This indicator can be used cold, in the presence of carbonates, and is very sensitive. It reduces the alkalinity as given by Dr. Pickerill. Phenol-phthalein, with the addition of a bit of potassium oxalate to take care of the calcium salts, and boiling, adding by tenths N/100 HCl and boiling again, repeating until boiling no longer causes it to redden, gives very accurate results.

Dr. Pickerill deals for the most part with the saliva under stimulation, but not wholly, for he advocates a protracted diet of acid foods, thereby producing a more alkaline saliva. It seems

to me that it is during the longer intervals between meals, when mechanical friction has passed, and when stasis can best occur, that the bacteria find the opportunity for the largest production of acid. It is the character of this slowly exuding saliva that has the more prolonged effect upon caries, rather than the flow that follows the stimulation of eating, and persists only for a few minutes after. In either case the saliva depends for its individuality on many systemic phases, some of which have been indicated. The saliva may contain foreign or morbid products, as I have shown in different articles. It is capable of alteration, but demands familiarity with physiological principles, together with a knowledge of chemistry sufficient to guide any attempts at treatment.

SUMMARY AND PRACTICAL SUGGESTION.

One aim of this article has been to emphasize the fact that many systemic conditions are directly reflected in the saliva and act to promote decay.

Another idea is to show that the condition of the surrounding parts, by furnishing proteolytic bacterial substances, encourage tooth decay. It is desired to suggest the consideration of the saliva as a medium furnishing acid-forming bacteria with necessary nutritional requirements, and not simply as a neutralizing agent for acid already formed.

We recommend, then, as general suggestions, coarse foods, and sapid and acid foods as salivary stimulants. We recommend also dietetic consideration on account of the nature of the metabolites, attention to intestinal conditions on account of the toxemias that result,([13]) and fully as much attention to the state of the kidneys for very similar reasons([14]); and finally, seeing that the adjacent anatomy is free from inflammatory and catarrhal states.

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Discussion.

Dr. E. P. BRADY, St. Louis, Mo. In reading the able paper which the essayist has presented it occurred to me that anyone who has not entered this field

of study cannot appreciate the enormous difficulties that present themselves and seem to baffle every effort upon the part of the investigator.

A study of the saliva shows that that fluid is subject to many influences which tend to change its composition, as has been mentioned. The saliva secreted by a resting gland differs from that secreted by one that is under stimulation. The composition differs in different individuals also; it is individual in character. It is also found that, depending upon the variety of nervous stimulation, the character of the saliva secreted may be materially changed. To illustrate: The secretion from the submaxillary gland under a stimulus from the facial nerve is abundant, limpid, low in mucin, etc., while that produced under a stimulus from the sympathetic nerve is scanty, rich in mucin, and of rather high specific gravity. My reason for bringing this fact forward is that several cases have come under my observation in which grave pathological conditions of the dental organs have existed, and all of the patients were under treatment for nervous disorders. I am not prepared to draw the conclusion that a disturbance of the nervous system would also affect the nervous stimulation of the salivary glands to such an extent as to be the auxiliary cause of the pathological condition existing, however an abatement of the general disorder showed a corresponding improvement in the dental conditions. I am working in this field at the present time, and am not prepared to make a definite statement as yet.

I have not approached the study of the saliva from the same point of view as the essayist, and there are several points of consideration which he has failed to mention which appear to me of prime importance—as, for instance, in reference to the saliva from various persons in whom caries of the teeth does not prevail: How does it behave when it is incubated?—that is, Is lactic acid formed to an appreciable amount? How do the results from these tests compare with similar tests performed with saliva from mouths in which caries prevails? If the saliva in any of the above cases were alkaline to start with, of course the decrease in alkalinity would show that acid had been formed during the incubation. The point to be proved in the above would be: Is lactic acid formed in mouths free from caries?—and, if so, what is the combating element of the saliva? Would the alkalinity, if present, neutralize this acid?—or, conversely, Is the saliva of so-called immunes deficient in nutrient material?

It is understood in these experiments that the various carbohydrates be added to the salivas. In the classification of micro-organisms, the lactic acid bacillus is generally classified as one requiring the presence of nitrogen compounds to meet nutrient requirements. One authority claims that lactic fermentation occurs in the various carbohydrates, when animal nitrogenous matter is present. It is reasonable to believe that albumin, globulin, and mucin can meet these requirements. One or two investigators have experimented with the saliva, using various commercial enzymes with the hope of ascertaining if the lactic acid present in saliva be due to enzyme activity. No definite results were obtained; still the fact remains that an enzyme can be isolated from the lactic acid bacillus which produces the specific fermentation action of the mother organism. Also it has been shown that some substances in certain

concentration kill the ferment and do not interfere with the action of the enzyme. This problem is rather complicated, and, as this field of investigation may be considered in its infancy, it is hardly in order to recall the various theories that have been offered as to the formation of lactic acid by the various enzymes. From what has been said, however, we may see that, although the saliva may be deficient in nutrient material, still lactic acid may be formed by the presence of a small quantity of enzyme acting upon carbohydrate material.

It is a well-known fact that constitutional disorders have a direct action on the nature of the saliva, and there is no need of any further elaboration upon this subject.

In regard to the use of the various indicators for determining the degree of alkalinity or acidity, it may be stated that Foa claims that the actual alkalinity is always considerably less than that found by titration, while the reaction as determined electrometrically is nearly neutral.

In the case of using $KHC_4H_4O_6$ as a mouth-wash, especially at night, it is only reasonable to believe that during this period, the mouth being at rest, even if the saliva be alkaline the interstitial spaces, the points that more readily succumb to caries, will not be penetrated by the saliva, and consequently the acid formed will not be hindered in its action; while on the other hand, if the treatment suggested by Dr. Miller be followed—*i.e.* if, in acidity of the saliva, milk of magnesia be used—the physical property of this mixture will keep it in contact with these points, and thus keep them alkaline.

The author suggests that the saliva be considered as a medium furnishing acid-forming bacteria with the necessary requirements, and not simply as a neutralizing agent for the acid already formed. In accordance with this suggestion it seems plausible that in those cases in which there is a prevalence of caries, the alkalinity of the saliva would in no way interfere with the activity of the micro-organism, but simply neutralize the effect of the acid formed; and in considering the nature of the mouth-washes used, necessary provision should be made not only to neutralize the acid, but also to inhibit the action of the lactic acid organism.

In conclusion, I wish to express my approval of the general suggestions offered by the essayist, as they all have a direct bearing upon the nature of the saliva and also the factors provocative of pathological conditions of the oral cavity.

Dr. Russell W. Bunting, Ann Arbor, Mich. There has never been a time in the history of dentistry when there was such a widespread interest in the cause and control of caries as is being manifested today. Everywhere we find men who have enough interest in the subject to spend considerable time and endeavor in the following out of some specific feature of the problem, and who are adding to the sum of acquired knowledge on the subject.

Since the trend of modern investigation seems to point out that the variable forces which determine the susceptibility and immunity of the teeth to caries lie outside of the teeth, the greater number of the investigations have been focused upon the saliva and its contents, seeking in that fluid the determining factor in the process. If, then, the saliva plays so important a part in the process, it is

very necessary that close study be made of this secretion to ascertain its component parts, and their behavior with respect to caries. The paper to which we have just listened is a report of valuable work along this very line, and will be a distinct addition to the literature upon the subject.

The author has well stated his premise when in the opening paragraph he says that "The problem of caries is to determine the differences which exist between the saliva of the mouths in which microbic life extensively flourishes, and the saliva of those in which it is inhibited." Next, he has, by a long series of experiments, determined that phosphates, sugars, amino-acids, etc., stimulate fermentation in the saliva, and that carbonates and chlorids inhibit it. He has then gone into that very important and ultimate field toward which all investigators must gravitate—that of the dietetic control of the salivary secretion—and has suggested methods for decreasing the fermentations in the saliva.

All of this is very important, and is of especial interest to me, inasmuch as I have been engaged in studies of this subject from a somewhat different angle for the past two years. I have examined and incubated a large number of salivas, looking for some that would refuse to form acid. I have found that they all undergo acid fermentation in their natural state, some forming more acid than others in a given time, but those which showed marked differences were few in number and did not in any way coincide with the susceptibility or immunity to caries. In any case, the amount of acid formed in any saliva was inconsiderable as compared with that which would be formed in any of them upon the addition of one-half gram of bread.

The results of my experiments have led me to believe that the amount of fermentation in a given saliva is not so much dependent upon the particular bacterial flora present, or the presence or absence of some restraining influence, as it is upon the quantity and the character of the food which is available for fermentation. Carbohydrates must be present either in the salivary secretion itself, or come from ingested foods from which the acids may be formed. That the presence of amino-acids will accelerate the action of the acid-forming bacteria, as reported by Dr. Howe, is an interesting feature.

But interesting and important as is our discussion of the fermentations of the mouth and their relation to dental caries, it does not seem reasonable that we should emphasize this factor to the exclusion of all others, as the author seems to have done. For the process of caries, acid fermentation is indispensable, but it is also necessary to have an accessory factor—namely, protection to the acid-forming bacteria and to the acids which they have formed. The acids must be confined against the tooth, and some provision made to keep the saliva from diluting them and washing them away. We have all seen filthy mouths in which the fermentations were very high, and yet there was no caries. Acids certainly formed in these cases, and in no small amount, but they have not been able to affect the enamel of the tooth. It has been protected either by the filth itself, or by some form of plaque which was not conducive to caries. So that in the investigation of caries from the standpoint of the saliva we must, on the one hand, look to the acid fermentations of the foods, both salivary and ingested, and on the other,

inquire into local conditions immediately about the teeth which make it favorable or unfavorable for the acids to attack those organs.

There is great need for further work to be done along these lines. Confined as we are to the saliva, we are under a great handicap, for we are dealing with a perverse and fickle fluid that seems to resist our every effort at investigation. By the nature of the secretion and by the variability of its constituents the most simple reactions are obscured and their veracity may be questioned. It is just such investigations as this, applied to every phase of the problem, that are needed. Careful and painstaking research must be carried on by a number of men who are well qualified to undertake the task, to get first a fuller understanding of the basic principles in the saliva, and then to study its relation to dental caries. It is a big work, and one of such importance as to be well worth our best endeavor. I wish to congratulate Dr. Howe upon the research he has made, and the association upon the presentation of his paper.

Dr. Howe (closing the discussion). The criticisms given are very interesting, and show, for one thing, the need of more extended study of oral pathological processes. They are, further, an evidence that creditable work has already been carried out upon these most important questions. In my paper I have endeavored to present some ideas respecting the constituents of the saliva that might act to stimulate or interfere with bacterial growth. In other words, I have presented a study of the saliva as a culture medium. The importance of the media to the bacterial growth may be further seen in the fermentation of sugars. It is the sugar in the souring milk that makes the lactic acid. Solutions of sugar exposed to the air are always converted into lactic acid solutions. So that we see that here it is the medium that controls the lactic acid fermentation, fully as much as the bacteria. A very great number of bacteria have been isolated that are concerned in this kind of fermentation—yet we must always have sugars or starches for them to act upon in the production of lactic acid. Other contributory factors have been considered in the paper which I have had the pleasure of presenting.

The next order of business was the reading of a paper by Dr. Marcus L. Ward, Ann Arbor, Mich., entitled "Conflicting Opinions Concerning the Manufacture and Use of Alloys for Dental Amalgams," as follows:

Conflicting Opinions Concerning the Manufacture and Use of Alloys for Dental Amalgams.

By MARCUS L. WARD, D.D.Sc., Ann Arbor, Mich.

In order to reach that part of the subject that should be of most interest to the profession at this time, it will be necessary to review so much of the literature that the title of the paper might well be called "The History of Dental Amalgams Since Dr. Black's Work." When the writer took up the work of teaching upon filling materials it became necessary, in order to get the

requisite information to give much of a course, to do some work on the subjects involved. Practically nothing had been put in form for this purpose. The work of Dr. Black on alloys was in print in the *Dental Cosmos* in 1895-96, but was as he reported it, and not in good form for use by either practitioners or students of dentistry. A few other subjects were likewise in print, but of these the same might be said. It soon became apparent that the subjects least understood and demanding the most attention were those of alloys and cements and the other plastics.

PREVIOUS INVESTIGATIONS BY THE WRITER.

As a result of work in this field I have been called upon at different times to discuss the subject of alloys. One of my first papers appeared in *Cosmos* for December 1905, under the head of "Some Things About Alloys Not Generally Understood." I was prompted to write that article because I found, generally, that dentists did not understand the subject. The difference between the two classes of alloys that resulted from Dr. Black's work was not generally realized, nor the difference between those two classes and the alloys made previously. The same was true regarding the alloys that were high in silver and marked "Rapid setting," "Medium setting," "Slow setting." Various opinions were held regarding the cause of spheroided fillings. The use of more mercury to make a plastic mass than was to be left in the filling was quite generally held to be injurious, weighed proportions being considered the correct method of combining the alloy and mercury, and a change in formula the result of any other procedure. In the *Dental Review* for 1907 (vol. xxi, p. 406) appeared another paper by the writer, entitled "Some Reasons for Instituting a Public Means of Protecting the Profession Against the Use of Poor Alloys." This article implied that one or two of those whom I supposed possessed information that would be helpful to me and the profession were not giving it out, or else did *not* know what they were given credit for; and that not only myself, but dental teachers generally, were not able to present the subject of alloys to students in a manner that would compare favorably with the presentation of similar subjects by teachers in engineering. It was pointed out that some alloys on the market appeared to be very poor and others very good, and that there was no reliable way for the dentist to find out the difference between the two; also that conscientious and capable manufacturers differed as to just what constituted a good alloy; also that the manufacturers who were making what appeared to be our best alloys were claiming to be following Dr. Black's plans, and that analyses of such products showed them to be composed of from 65 to 68 per cent. silver, 26 to 28 per cent. tin, 3 to 4½ per cent. copper, and 1 to 2½ per cent. zinc. Also, that while some of the claims made by the manufacturers regarding the use of different quantities of the different constituents had been recognized by some of those who did not follow such claims, the use of zinc was open to question, because some were attributing to it the property of facilitating long expansions after the filling had been inserted, and others were claiming it to be secondary to other materials in causing this phenomenon.

An example of this difference in opinion regarding the use of zinc was mentioned and the amount of the difference given, though the names of the manufacturers were not given—for fear that an injustice might be done one of these two manufacturers, both of whom I had every reason to believe were conscientious in their claims, and because the difference between the two alloys mentioned was not great enough, in my opinion, to warrant taking the chance of injuring one of these manufacturers' trade. For reasons which will be obvious later, I will mention these names at this time. They were the Dental Protective Supply Co. and the N. K. Garhart Co., then of Indianapolis, now of Boston.

Along with the other things mentioned in the paper were reported some tests for strength of these alloys, which showed that those coarsely cut and containing the smaller quantity of zinc would be a longer time in reaching their maximum strength than those with more zinc and finer cut. The so-called plastic alloys were condemned as a class because of their low strength and long expansions, but to avoid condemning any one manufacturer's product I mentioned nine who were selling the same class of alloys, and mentioned, along with the plastic alloy that I was condemning, for each manufacturer a high silver alloy marketed by the same concern, thus enabling the dentist who desired to change from the plastic alloys to the high silver ones to do so without having to purchase a different manufacturer's products.

In *Cosmos* for 1908 (vol. l, p. 109) appears another article by the writer, entitled "The Effect of an Excess of Mercury upon Shrinkage, Expansion, Strength, Change in Composition, and Stability." In discussing this subject it seemed advisable to mention the names of some of the manufacturers' products to show the similarity in quantities of mercury required to make a plastic mass, so I mentioned eight of those mentioned in the previous article in 1907.

THE DENTAL PROFESSION'S CHANGED ATTITUDE TOWARD PLASTIC ALLOYS.

Not only up to this time, but subsequently, has the discussion of the subject by me been confined largely to the things that could be improved by the dentists. My reason for this was that I was satisfied that many of the leading manufacturers knew much more about the subject than did the profession, and were giving to the profession products as good as could be produced with our present knowledge, while on the other hand I saw many things that the profession could improve on. My aim had been to get the profession informed on the subject to such an extent that they could separate for themselves the reliable from the unreliable manufacturers; at the same time giving the manufacturers a chance to see the tendencies of the profession's demands and make improvements where possible. And, in fact, there has never been anything in my hands so effective in separating the good alloys from the poor ones in any community, as to give the dentists detailed information about alloys in general rather than to attempt to injure the manufacturer. At the time these papers were published it is clear that I regarded eight or nine of our manufacturers of alloys as capable of supplying products that were as good as our present knowledge of the subject

would permit. I had mentioned the L. D. Caulk Co., the S. S. White Co., the Dental Protective Supply Co., the N. K. Garhart Co., Gideon Sibley Co., H. D. Justi & Son Co., and two or three others among those who were furnishing products that would give good results if the dentists would do their part in handling them. I feel certain that the manufacturers themselves will grant that this process of giving information to the profession has reduced their sales of the plastic alloys markedly, but made a corresponding increase in the sales of their high silver alloys. In fact, in many localities the representatives of the above-named houses will not try to offer to the profession one of the plastic alloys, because they know well that dentists have learned the difference between these and something better. The result is that the representative makes a sale of his high silver alloy. He must meet what the dentist demands or lose his trade; so we can see that the better informed the dentist is, the better informed must be the manufacturer and his representative. It seems, then, that we must not lose our confidence in a manufacturer because he supplies one of the plastic alloys to those who want it, so long as he is capable of furnishing one of the high silver alloys to those who want it. That does not make him to be distrusted: he is simply supplying what is demanded of him. For a year or two now I have had a great number of letters from all parts of the country asking what I had to say regarding the articles that have appeared mostly in the *Cosmos*, and Dr. Black's statements in his book on "Operative Dentistry," relative to the quality of the alloys that I had mentioned at various times as being the best we have. It is plainly to be seen that the channel by which these articles have reached the profession is such a prominent one that the articles have caused an unsettled condition, regardless of the obscurity of one or two of the men themselves.

MC CAULEY'S ALLOY STUDIES, AND THEIR MISLEADING EFFECT.

For example, appearing in *Cosmos*, February 1912 and January 1913, and in the proceedings of this association, are articles by Dr. C. M. McCauley of Abilene, Texas. In discussing one of these papers Dr. J. A. Bliss of Ruthven, Iowa, says (*Cosmos*, January 1913, p. 58): "Dr. Black makes the statement that the only three elements that should enter into a perfectly good alloy are silver, tin, and copper. He emphasizes that any zinc introduced into an alloy is alarming, if we consider the fact that it does not alloy uniformly with other metals, and consequently in one portion of one and the same ingot there may be a percentage of zinc above what is intended, and in another portion of that ingot there will be less zinc than was intended, and this necessarily results in an uneven alloy. Dr. Black, therefore, excludes zinc as being detrimental and undesirable, and *we are forced to the view* that any alloy that contains zinc should be excluded from our tests, which means all but two or three. This is alarming, when we consider the fact that of all the fillings made in the United States, at least seventy-five per cent. are made with amalgam." Dr. McCauley says, in the same article that Dr. Bliss was discussing: "I still maintain that the method of making and balancing alloys as discovered by Dr.

Black is the only scientific and dependable method which has been introduced up to this time." We may note at this time that Dr. McCauley calls the method of Dr. Black's "scientific." In the same article Dr. McCauley says that "Silver, tin, and copper are the only metals that should be used in alloys." In the discussion of the same article Dr. McCauley gave some results of tests on the following alloys: Rego, Crandall's, Fellowship, Twentieth Century, True Dentalloy, and others. In these results it may be seen that Rego, Crandall's, and Fellowship are given a much better showing than are Twentieth Century and True Dentalloy. In fact, he reports three tests on Twentieth Century, all of which shrank, and four tests on True Dentalloy, two of which shrank. To those who do not follow the alloy question closely this may seem a very ordinary thing to happen, but to those of us who have followed the question in some detail it appears a strange coincidence that the three alloys to which Dr. McCauley gives first place should be made with little or no zinc, and that the Twentieth Century and True Dentalloy with more zinc should be given such a poor showing. This becomes more strange because of the great popularity of these two alloys, and, if these tests were representative of the true movement of these alloys, would tend to show that the dentists were not good clinical observers, or that a little shrinkage made no difference; and that the statements made by me at various times that there were several good alloys in the market, in which these two were included, were open to question. Another strange coincidence appears in the tests reported by Dr. McCauley in which he gives Garhart's Gold White an expansion of 342 points, when Mr. Garhart has been about the only manufacturer to say that he adhered to the given formula, and, like nearly all the rest, to the use of zinc—both of which Dr. Black does not now approve of.

Just what Dr. McCauley expected to gain by publishing a report of this nature is not clear. It would seem, however, that the principal thing that he did was to point out that he thought—what Dr. Bliss said in the discussion, viz—"That the condition is alarming, and that there are only two or three alloys in the market that were what they should be, and that these alloys are zincless alloys." Dr. Bliss in another part of the discussion makes a plea for assistance. He says, "I assure you that it is a great responsibility, and if you knew some of the persecutions endured by him (Dr. McCauley) since he began these investigations, you would be indignant. It is a shame that one man should bear the brunt of these attacks. In justice, therefore, to Dr. McCauley and his fellow investigators, these tests should be made under the supervision of the National Dental Association, or some state society, as a part of the society's work, thus relieving the investigators of any personal responsibility." These statements of Dr. Bliss just about represent the condition of affairs in the profession after the publication of results of the nature of the one published by Dr. McCauley, in which he places the largest, most reputable, and most competent manufacturers in the same class as those who could not be expected to furnish to the profession products of a high order, without taking the ordi-

nary precautions of a scientist by giving some of the details of how the tests were made.

The publication of such results, which are damaging to reputable manufacturers and conflict with the opinions of others, must be carefully placed before the profession if the result is not to be generally bad instead of good. While Dr. McCauley makes the statement that "It is not intended that the practitioner should accept the above figures as conclusive, and select his alloy therefrom," the evil of his tests is not corrected. He has placed the good with the bad. He has gotten many of the dentists who have not looked into the matter to doubting; and when dentists begin to think that all are likely to be bad, the really bad stand about as good a chance as any.

THE ALLOY MANUFACTURERS' NOTABLE EFFORTS.

I have made the statement several times that some of the best manufacturers differ as to what constitutes the best alloy for all purposes, but that I believed these differences of opinion to be honest ones. I have also made the statement that as a rule the larger supply houses were best equipped for distributing uniform supplies because they were in the best position to secure the services of competent men. I have arrived at these opinions because I have known some of them willing to send men the entire length of the country to consult me regarding some comparatively minor things that would help them, and to build duplicates of my apparatus so that they could check me, and because I found them watching every piece of literature on any subject that had any bearing on the problems before them, including such publications as the Journals of the American Chemical Society, the Society of Mechanical Engineers, the Institute of Metals, and the Institute of Testing Materials, and watching the reports of the alloys research committee and purchasing about every work that came out on the subject of metallurgy.

These things have convinced me that we have no reason to become alarmed about many of the manufacturers not doing their part. There are some differences of opinion among them which we, as a profession, can help to settle clinically if no one presents any experimental data; and until these differences of opinion are settled, we can, in my opinion, rest assured that many of the manufacturers are even more anxious than we are that their products stand the tests that are demanded of them. One of these differences of opinion that has been the cause of two or three attacks upon the work of Dr. Black is that concerning the use of a plan of balancing instead of a given formula for making alloys. Some of the best qualified manufacturers we have, seem to take advantage of the statement of Dr. Black that a fixed formula is not good for general use in making alloys; while others who are good, reputable men present some good argument that this is nothing more than an acknowledgment that those who use a varying formula have not mastered the metallurgical part of the work. These statements, coming as they often do through our leading journals, and often in the proceedings of prominent societies, keep the practitioner somewhat busy trying to find whether it is simply advertising matter or whether it is a plan that has

merit. Dr. Black says ("Operative Dentistry," vol. ii, p. 310), under the heading "Experiments with the Silver-Tin Alloys," "From this point another short course of alloys only ½ per cent. apart was necessary to find the exact balance which would produce an alloy that would absolutely lie still while hardening. When this was found, it was a good formula for that batch of metals, but not for another batch, for the purity might be different; and the formula for each new batch of metals had to be found. Therefore, no fixed formula could be good for general use. If it were possible to use chemically pure metals a fixed formula would be possible, but such metals would be too expensive for use in dentistry."

ATKINSON'S CRITICISM OF THE G. V. BLACK METHOD OF ALLOY-MAKING.

In the June 1913 issue of the *Cosmos*, at page 584, under the subheading, "The G. V. Black Method of Alloy-making, and Its Defects," W. W. Atkinson says:

Had Dr. Black left the utilization of his work to others, the luster of his achievement would now be undimmed; but unfortunately he followed his researches into a strange realm, that of metallurgy, and as a result threw the question of alloy-making into confusion. He developed an elaborate system of "balancing" which is entirely empirical, and the system itself is condemned by the facts. Summarized, it is as follows: First—As, in his opinion, all metals procured commercially for use in amalgam alloy-making are impure, and as impurities aggregating from 4/10 to ½ of 1 per cent. are fatal to the attainment of certain requirements in an amalgam made from their alloys; therefore test batches must be made from each new lot of metals, and, upon the basis of the results obtained on the micrometer and dynamometer a perfect "test" formula must be evolved from which the regular batches intended for use are to be made. Second—Alloys are not chemical compounds, but mere physical solutions of two or more metals within each other, the percentages of which may be varied at will. Third—No "formula" is needed when the manufacturer follows the G. V. Black method of "balancing."

Let us take up the first of these assumptions. Upon the authority of Mr. Jacob P. Eckfeldt, chief assayer, U. S. Mint, Philadelphia, bar silver of a fineness of 999.5 and from that point upward to 999.75, is commercially available at the U. S. Assay-office, New York City, N. Y., at current market rates. This silver the writer is able to purchase, regularly, from a Philadelphia broker of precious metals, who does not seem to regard its fineness as being espcially remarkable. Purified shot copper, electrolytic, has a guaranteed fineness of 999 plus, and analyses have shown that the odd one-thousandth of impurity is oxygen, due to dissolved oxids, an easily corrected deficiency. "Straits" tin, purified, has an average fineness of 999.5, often it is finer, and a recent analysis of commercial tin made for me by Booth, Garrett & Blair, showed a fineness of 999.61. Thus a "G. V. Black" alloy made from a formula approximating 68 per cent. Ag, 27 per cent. Sn, 5 per cent. Cu, made from metals of the purity noted, should be within 0.036 of 1 per cent. of 1000 fine, a negligible difference.

It might be argued that such metals were not to be secured at the time of Dr. Black's investigation, but that would not be correct, for pure metals were certainly then obtainable at an added retail cost to dental alloys not exceeding 20 per cent. With such metals available, a formula once established could be continuously reproduced, provided the work were done by a metallurgist having the knowledge and exercising the care needed in such operations.

Pursuing this, then, to its logical conclusion, it must have been assumed that the dental fraternity was unwilling to pay a price commensurate with an alloy of pure metals, which assumption seems untenable.

The second assumption, that the metals of an alloy may be varied in their percentages, which means that their chemical affinities may be disregarded, shows that Dr. Black

either did not avail himself of the copious literature on the subject or entirely ignored it, and therefore merited to some extent the caustic criticism of Dr. Ad. Fenchel, who denominated Dr. Black's measurements as superficial and his metallurgical investigations as barren of a true comprehension of the internal structure and chemical constitution of alloys.

* * * * *

The third assumption, that no formula is needed for the making of an amalgam alloy when the manufacturer follows the G. V. Black system of "balancing," might at first thought be dismissed as the extravagant utterance of an overzealous enthusiast, were it not for the commercial advantage which may be taken of it, to the consequent detriment of efforts to secure uniformity in this most important material. It has given rise to a multiplicity of formulæ, afforded opportunities for advertising claims of wonderful and mysterious properties secured through the medium of awe-inspiring "tests" with micrometers and dynamometers—all with the glory of Dr. Black's prestige skilfully interwoven—and, through the relatively enormous expense which attaches to frequent analyses of such alloys, has blocked attempts to ascertain their constituents or to secure other details of importance excepting those of strength and volume change. This leaves the behavior of amalgam fillings made from these "tested alloys" to the "test of time," the very thing that Dr. Black most strongly and most justly condemns. The assumption that no formula is needed, however, falls of itself, for it is a well-known fact that, under the Black method of "balancing," a formula must be worked out before a melt is made, and this formula must be based upon a previously attained "tested" formula which has met the physical requirements noted.

N. K. GARHART'S VIEW.

Whether or not this argument stands the test, of course, depends upon the amount of corroborative evidence presented in the future. That I might find out more in detail how Mr. N. K. Garhart felt about the matter—knowing as I did that he was one of the manufacturers who did not believe in this plan of balancing, and that he, like Mr. Atkinson, had come in actual contact with the advantage that those had who were privileged to use this form of advertising, and that he actually believed that the use of such advertising and its acceptance by the profession and teachers of dentistry blocked the efforts that were made to secure uniformity—I recently took the matter up with him privately, and later secured his consent to use some of his letters. A part of one of them follows:

I am now taking you back to the early period of Dr. Black's writings, and in which he referred to filings giving better results than shavings. His explanation or theory as to the cause was a very weak one, and in my opinion not scientific. At the conclusion of his early writings in the *Cosmos* he contended that you could not make a satisfactory alloy from a "set" formula—and about which time a course in alloy-making was added to others of the Northwestern University. Caulk, Sibley, and the S. S. White Company sent their men there to take this course. These parties have consistently followed this argument in their advertising to the dental public. While I was in Indianapolis, I published a small booklet on the manufacture of alloys, the latter part of which contained some experiments on the "thickness of cut." These experiments showed that as a given formula was cut progressively thicker or heavier, the factors of efficiency were increased accordingly. I also stated that shaved alloys at that time were thin in cut while those of filings were much heavier; and so this was the real reason why Dr. Black found filings to be more efficient. In later years Dr. Black has verified this important factor, and states that a suitable alloy depends on the fineness of cut as well as other important details. Thus, later, my work on thickness of cut was confirmed by Dr. Black.

Dr. Black has been more or less silent concerning the subject of "set" formula since

then. Now the point comes up, Did Dr. Black realize that the real secret of producing a uniform alloy depended on automatic processing?—that his statement "You cannot use a 'set' formula" was not scientific, or not in keeping with facts, was found to be an error? Did he realize so afterward? Yet this very statement has been the foundation for faking on the part of our large manufacturers. They were wise enough to take advantage of this claim and use it for their own ends. The main point was, Our formulas are secret; chemical analyses will not reveal their make-up. We have to change the formula before we can make a satisfactory alloy; therefore this constant variation in our formulas makes their percentage of composition inconstant. Thus these heaviest advertisers have been deluding the profession on this point all of these years.

"WHO IS WRONG?"

There can be little doubt about how these two manufacturers feel regarding this plan of balancing. Neither can there be much doubt in your minds about the effect of such caustic and contradictory statements in preventing the profession from arriving at a definite conclusion from the standpoint of knowledge of the subject, or the selection of products for use in the practice of dentistry. We may expect the question will be often asked: "Who is wrong?" as long as such differences of opinion exist. but as one of the principal objects of this paper is to restore, as far as possible, confidence in many of our manufacturers' ability, and to temper somewhat the widespread feeling that the question of amalgams is one of chaos, I want to emphasize the statement that I made in the last edition of the "American Text-book of Operative Dentistry," which is as follows:

A review of Fenchel's recent work and the earlier work of Kirk and Burchard, each of whom have viewed more closely the chemical phases of alloys, would not suggest the plan offered by Dr. Black. The question "Why does a fixed formula not give a definite movement during the setting?" has been asked of the writer so many times by teachers and practitioners alike, that it would seem that the plan had not been understood nor accepted generally by the profession. All seem agreed, however, that the plan gives as good results and furnishes us with as good alloys as our present knowledge of the subject will permit. It is the manner of reaching the result about which there seems to be a difference of opinion.

I treated the question at that time considerately—First, because I did not want to stir the profession into a state of distrust when the evidence would not warrant it; and second, because some of the technique involved in the plan would be good to follow as a check against error even though a definite formula were determined upon and definite metallurgical methods arrived at in the manufacture of these products. It would seem, then, that the objections to the plan were—First, that it furnishes an excellent advantage in advertising to those who are privileged to use it; and second, that it implies indefinite methods of manufacture and difficulty in securing metals of a high degree of purity.

To one who has gone far with the study of metallurgy as a science and reached the place where he presents his results in the form that Dr. Fenchel and scores of others present theirs, or has any conception of the statement of Dr. Kirk in his editorial in the June *Cosmos*, that "It is the business and end of scientific research to ascertain the exact truth, which when ascertained and systematized into an organized grouping of data is what constitutes science," the statement of Dr. Mc-

Cauley that "The plan of making and balancing alloys as discovered by Dr. Black is the *only* scientific and dependable method which has been introduced up to this time," not only appears like an utterance from one who not only had not done much work, but had ignored the literature on the subject except as to that portion presented by Dr. Black, the greater part of which was seventeen years ago.

W. W. ATKINSON'S VIEWS SCRUTINIZED.

Another phase of the problem has been placed before the profession within the last two or three years which because of the nearness of it to the principles of the chemistry with which the profession is most familiar, promises to upset for all time the plan of balancing which the profession has had for its consideration for the last seventeen or eighteen years. The work of Fenchel has already been referred to, also one of the articles of W. W. Atkinson. Another article by Mr. Atkinson appears in *Cosmos* for August 1912, which, like the one previously mentioned, has principally to deal with what he designates as a discovery. Whether it be a discovery, and whether the discovery, if it so prove, has merit, remains for the future to tell. One thing seems true at this time—that it is so near to it that, like the plan of balancing, which he condemns, it promises to give the product which he offers as an example of his discovery advertising which that product may not merit. He criticizes about every alloy made upon the ground that they are made "without respect to their atomic relationship, and therefore, within them, atomic compounds are formed which are surrounded by an unappropriated surplus, a eutectic perhaps, which makes physical balance impossible;" but he presents practically no chemical evidence that this compound exists, nor if it does exist, that he has produced it, nor if it does exist and he can produce it, that it possesses properties superior to those that are not made in atomic ratios. The profession should be grateful to anyone who will present the subject in question along chemical lines, because it gets all to thinking along lines of accuracy and truth, but if we are to condemn the mystery surrounding the marketing of the alloys we now have, and are to make real scientific progress, we must demand of Mr. Atkinson the evidence demanded by those who deal with these problems from no other standpoint than a scientific one—or else he, like the ones now using the Black plan of balancing, will be getting what he terms "commercial advantage." Mr. Atkinson points out that silver, copper, and tin are the only metals that should be used in making alloys for amalgams, and says: "Amalgams made from chemically balanced alloys do not discolor—although they do not and cannot contain zinc—for the electrical and chemical affinities are satisfied." Following this he says that "A surface discoloration occurs when a patient is taking the iodids medicinally, but zinc in this instance offers no protection." He gives analyses of five G. V. Black alloys made by Dr. S. P. Burns, and in commenting on them says:

> The sum of the percentages divided by 5—the number of alloys noted—gives the following averages: Ag 66.76, Sn 26.92, Cu 5.408, Zn 0.814, Au 0.056, and therein lies the significant fact that these empirical experiments were successful only when the formula approached the percentage nearest to the established chemical compound of tin and

silver, Ag_3Sn—for Ag_3Sn = Ag 73.1 per cent. plus Sn 26.9 per cent., and the averages of the percentages of silver and tin show the following results when in mutual relationship:

Average of
66.76 parts silver = 71.264 per cent.
26.92 " tin = 28.736 " "

This undoubtedly results in the formation of Ag_3Sn + the excess of silver and tin which combines with copper and zinc to form mixed crystals, so that the mixture or alloy consists of Ag_3Sn + mixed crystals and eutectic of silver, tin, copper, zinc, and, in the case of Odontographic alloy, gold.

It is obvious that Mr. Atkinson attributes what success the alloys known as Black's have had to the silver and tin being in percentages close to the formula, Ag_3Sn, which he says is established. In his first paper he discusses the chemical theory of alloys, a part of which paper is as follows:

There are two theories regarding amalgam alloys, the physical and the chemical. The first holds that alloys are probably solid cold solutions of two or more metals within each other, and may be varied in percentages irrespectively of their atomic relation, and to be satisfactory must meet certain requirements in the matter of strength and volume change. According to this theory, an amalgam must expand 1/20,000 inch in setting, and should withstand all stress of mastication.

The other theory is that all alloys should be made in chemical equivalence; that is, that the combining ratio of the metals is their atomic ratio, and that balance is only possible in this way. Both theories are correct in some respects. The first states the correct physical requirements of an amalgam, and the other points out the scientific means of attaining them. Both schools are in error in other respects—for, on the one hand, given percentages of given metals in combination with mercury will produce certain desired results, while on the other hand, the mere fact of chemical crystallization does not necessarily meet the physical requirements, for the crystal may be too soft or its volume change may be toward condensation.

Under the subheading "A Discovery and a New Amalgam Alloy," he says:

In September 1911 I deduced an alloy formula, with the metals in atomic ratio. It is based on the theory that chemical balance, other things being equal, is physical balance, and that silver, tin, and copper, by reason of their observed properties, are the most trustworthy metals with which to compound an amalgam alloy. Experiments were made to test my conclusions, which were entirely confirmed. The alloy compounded is the amalgam alloy instanced in another part of this paper. Its formula is Ag_2SnCu.

In his second paper, under the subheading "The Chemical Theory of Alloys," he says:

Chemistry has shown that certain alloys of metals undergo condensation in freezing, and that others undergo expansion; that the affinities of certain metals for each other must be considered before they can be perfectly combined into an alloy, and that the atomic law is the important factor in such combinations. Herein lies the significance of the failure of percentage alloys; they are not combined with respect to their atomic relationship, and therefore, within them, atomic compounds are formed which are surrounded by an unappropriated surplus, a eutectic perhaps, which makes *physical balance* impossible.

Therefore, bearing in mind the precision of its data, and the fact that such data afford the means whereby the physical behavior of alloys of metals may be accurately forecast, I place supreme confidence in the chemical theory of alloys, and *know* that it offers the only solution to the amalgam alloy problem.

While Mr. Atkinson admits that "The mere fact of chemical crystallization does not necessarily meet the physical requirements, for the crystal may be too soft or its volume change may be toward condensation," he later says that his alloy of the formula Ag_2SnCu is based on the theory that chemical balance, other things being equal, is physical balance. This leaves the real signifi-

cance of the term "physical balance" somewhat in doubt, and the chemical theory as he describes it open to question.

Since he says, however, that the percentage alloys fail because they are not combined with respect to their atomic relationship, and therefore, within them, atomic compounds are formed which are surrounded by an unappropriated surplus which makes physical balance impossible, there can be little doubt that he intends to imply that the alloys that are made in atomic ratios are superior, for dental purposes, to those made from percentage ratios. This seems to be quite a common error, and in looking over the alloys used for structural work one is impressed more thoroughly than before that seldom do alloys, made according to atomic ratios, meet the requirements which are demanded of them. The thing of most vital importance in the consideration of alloys for a given purpose seems to have escaped the observation of Mr. Atkinson —viz, that *alloys in their true sense are not chemical compounds.* When most metals are mixed there is not the total and complete alteration of properties which is the distinctive feature of chemical action between a metal and a non-metal. When the chemical compound does occur, then, we may expect the properties of the constituent metals to be more nearly lost than when the solid solution or mechanical mixture occurs. "Alloys" then, generally speaking, means the accumulation of properties of metals; and "chemical compounds" means, generally speaking, destruction of them.

That those who are interested in the subject may get a more clear conception of these questions, I quote the following from the introductory of A. Humbolt Sexton, which leads up to the statements by him that "Definite chemical compounds in no case form alloys of any industrial importance," and later, that "None of the definite chemical compounds are of any use in the arts," as well as the statement by Hiorns that "Most often, alloys seem to be mixtures of definite compounds with an excess of one or other metal," and the statement of Fulton that "Most of the physical properties of alloys are dependent—First, upon the formation of mixed crystals; second, upon the formation of chemical compounds; and third, upon the formation of a conglomerate of the two substances (eutectics or eutectoids)," also the statement by E. F. Law in discussing some of the alloys formed by definite atomic ratios of their constituents, that "They are perfectly homogeneous, brittle alloys, breaking with a conchoidal fracture—properties which render them practically useless to the art-metal worker":

When two or more metals are melted together they, as a rule, remain intimately mixed, showing little tendency to separate according to their densities, or, as it may be otherwise expressed, they remain in solution one in the other while they are in the liquid condition. When the mass solidifies, this state of uniform distribution or mixture may continue, or it may be broken up. In the former case the solidified mass will contain the constituent metals in a condition of more or less uniform diffusion, and such a mass is called an alloy. In the latter case the metals will separate according to their specific gravities, the heavier metal going to the bottom and the lighter rising to the top, such separation being as a rule the more complete the slower the solidification. The separated metals in this case are rarely if ever pure, but each retains a small quantity of the other, and strictly speaking both are therefore alloys. In practice, however, the term

alloy is restricted to those cases in which neither of the metals is present in very small proportion; the other cases being simply considered as metals containing an impurity.

An alloy is neither a mechanical mixture nor a chemical compound. An alloy is, then, an intimate mixture of two or more metals, and the term mixed metals has sometimes been used in place of alloys. This is, however, very misleading, as the alloys are much more than mere mixtures, and mixtures of metals may exist which are not alloys.

If lead and copper be melted together, and the mixture be slowly cooled, the metals will separate. If, however, the mixture be quickly cooled, separation cannot take place and the metals will remain mechanically mixed the one with the other, they not having had time to separate into distinct layers, but the mass will consist of intermixed particles of the two metals, and if it be heated up to the melting-point of lead this metal may be, to a large extent, melted out. This, then, would be a case of a mixture of metals, but not of an alloy. In an alloy, the mixture must be of such a character that the constituent metals lose their individuality, and become blended into a new substance which has properties, to some extent at least, unlike those of its constituents.

As a rule, substances which are not elements are divided into the two classes, chemical compounds and mechanical mixtures, but the metallic alloy cannot be made to fit exactly into either group.

In a mere mixture the particles, however small and however intimately they may be mixed, always retain their individuality, and the properties of the mixture are always a mean of those of its constituents. If the constituents be black and white the mixture will be gray, if red and white, a paler shade of red, and so on through all the other properties. This, as is well known, is not the case with alloys. Brass containing, say, 50 per cent. of copper and 50 per cent. of zinc, is yellow, and this yellow color is certainly not a mean between the red of the copper and the bluish white of the zinc; nor is the specific gravity, or indeed any other property of the brass, a mean between those of its constituents. The only point in which alloys always resemble their constituents is that they are distinctly metallic.

Alloys, therefore, are not mechanical mixtures.

A chemical compound contains the elements in fixed proportions, these being always simple multiples of the atomic weights, and some of the physical properties follow from the molecular weight of the compound. This is not the case with alloys. As a rule, the metals are not present in any simple atomic proportion, and further, the proportions can be varied often within wide limits without producing any great change in the properties of the alloy.

The metals do not show any strong chemical affinity one for another, but there is no doubt that in some cases definite chemical compounds of the metals do exist, but in no case do they form alloys of any industrial importance.

Solutions. There is still another form in which substances can exist which, while not a mere mechanical mixture, is something less than chemical combination. If salt or any other soluble substance be stirred up with water it disappears, or dissolves in the water, and the result is a solution of the salt. This solution has some of the properties of the salt; it has, for instance, a salt taste, yet its properties cannot be said to be a mean between those of water and salt. The salt dissolves without increasing the volume of the solution, so that the solution is denser than the mean between salt and water. The addition of the salt also lowers the freezing-point of the water, so that the freezing-point of the solution, instead of being a mean between that of water and salt, is lower than that of either, and by the addition of proper proportions of salt it may be reduced to about —22.5°C.

The essential character of a solution is that the constituents are so intimately blended that they cannot be separated or detected by mechanical means, whilst at the same time they have not entered into true chemical combination.

Solid solutions. As a rule, when a solution is frozen the constituents separate one from another to a larger or smaller extent, but this is not always the case. We can imagine a solution to become solid without any other change, and the result would be a solid solution in which the constituents would still be so intimately mixed that no

mechanical separation would be possible, and in which the properties would not be a mean of those of its constituents, but in which these constituents would not be present in the definite proportions required for a chemical compound.

Alloys. True alloys are never mere mechanical mixtures of metals, and though in some cases the metals do combine, yielding definite chemical compounds which often retain their metallic properties, none of these are of any use in the arts. Alloys are very frequently solid solutions of one metal in another, or of a chemical compound of the metals in the metal which is in excess. Many consist of mixtures of such solutions with definite substances that have crystallized out during cooling, so that the actual composition and structure may vary very widely; and each alloy, or rather group of alloys, must be studied separately, as it is impossible to lay down any except the most general rules.

The alloys of copper and zinc probably form as large, interesting, and useful a class of alloys as any in the commercial world. At least three have been recognized as having the following formula:

	Per cent.		Per cent.	
$CuZn$	—49.3	copper,	50.7	zinc.
$CuZn_2$	—32.7	"	67.8	"
$CuZn_3$	—24.6	"	75.6	"

If we now compare the alloys of commercial value with these percentages we find, instead of following them, there is about everything we can imagine, ranging from 90 per cent. of copper and 10 per cent. of zinc, to 15 per cent. of copper and 85 per cent. of zinc. Brass for wire often has about 72 per cent. of copper and 28 per cent. of zinc; brass for the more common work, such as fittings, etc., often has about 66⅔ per cent. of copper and 33⅓ per cent. of zinc. Brass for bolts, butts, etc., known as "Muntz metal," has 60 per cent. of copper and 40 per cent. of zinc; while if greater strength is desired the copper is furnished reduced to 56 per cent. and the zinc increased to 42 per cent., forming what is known as "Delta metal."

Of the alloys of copper and tin we find four described, as follows:

	Per cent.		Per cent.	
$SnCu_4$	—68.1	copper,	31.9	tin.
$SnCu_3$	—61.6	"	38.6	"
$SnCu_2$	—51.7	"	48.3	"
$SnCu$	—34.8	"	65.2	"

And we find gun-metal, one of the most useful of alloys, to be composed of from 8 to 11 parts of copper and 1 of tin, 90 per cent. of copper and 10 per cent. of tin being most generally used—a percentage ratio and not an atomic ratio. These two metals are often used for what is known as bell-metal in the proportions of about 80 per cent. of copper and 20 per cent. of tin, and in this instance we find percentage ratios. With the alloys of copper known as German silver one has but to look over the thirty analyses presented by Hiorns to find that the manufacturers are not only varying widely in the same constituents, but are often using a fourth and fifth metal to get some particular property.

The alloys of gold and copper, gold and silver, gold and copper and silver, and gold and copper, silver, and zinc, as they appear in scores of combinations for use in dentistry and in making jewelry, show that the percentage ratios far outnumber any possible atomic ratios. The same is true with the low-fusing alloys composed of lead, tin, bismuth, and cadmium. In fact, we can follow the same condition through the remainder of the non-ferrous alloys and all through the ferrous ones, each forming more evidence that alloys made in atomic ratios do not

necessarily mean alloys that are more desirable for dental or other purposes, *and when alloys in atomic ratios do occur, they are usually more desirable when modified by an excess of one or more of the constituent metals.* This is where the knowledge of chemistry and the use of the microscope applies, —not always in forming chemical compounds, but in determining whether they have formed, and the effects of excesses upon the physical properties. It is *these* methods that make the plan of balancing as suggested by Dr. Black appear empirical, and have made it possible for the trained metallurgist with his microscope to form quite accurate estimates of physical properties without having made the actual tests himself.

For us to accept the formula of Mr. Atkinson, Ag_2SnCu, as *being possible,* and that he can produce it, without some of this kind of evidence, means for us to ignore the doctrine of variable valency, and assume that the greatest of questions in metallurgy, solutions, is thoroughly understood by him. We have learned, when speaking of the valency of an element, that it is essential to mention with what other element that value takes effect. For example, iron is di- and tri-valent toward chlorin, but is tetravalent toward sulfur and hexavalent toward oxygen. We have also learned that many compounds remain as such only within certain ranges of temperature; and oftentimes the pressure exerted by the products of dissociation has a controlling influence on valency. Consequently, it is to be expected that the general affinity ratios of the elements are dependent upon external conditions, of which temperature seems to be the most important and pressure next in importance. An exhaustive examination of the dependence of valency upon the nature of the atoms with which it enters into combination, and the effect of external physical conditions, internal physical conditions, position in the periodic system, etc., makes the assumption of Mr. Atkinson that he is justified in substituting an atom of copper for one of silver in his tin compound, Ag_2SnCu, on the ground that silver and copper *form no compounds* and the valency of tin is constant, when there is at least one silver-copper compound known (Ag_3Cu_2), appear also open to question.

Discussion.

Dr. Clarence J. Grieves, Baltimore, Md. I wish to thank Dr. Ward for his valuable research in amalgam alloys. It seems that we have had a research meeting, and I do not know that we could find any greater argument for the necessity of dental research than these two papers by Dr. Howe and Dr. Ward.

It seems most unfortunate that when our profession decides that it really needs to investigate some phase of a subject, it finds that particular subject most difficult. It was thought that it would be easy to look over the saliva and by chemical analysis solve the whole question. The same can be said of amalgams, and you have seen this morning how easy it is!—for when we attack the proposition of alloys we find that an alloy is no simple thing, not a chemical compound nor a mechanical mixture—in fact, nobody appears to know just what it is; and right in this breach our help will come from such men as Dr. Howe and Dr. Ward.

I would like to speak for a moment from the standpoint of the general prac-

titioner. We all admit that there is one thing of which we should be sure, and that is the exact nature of what we put into the human mouth, particularly as we put it there with the hope that it is going to stay. So in taking up the question of amalgam, a material that today is saving more teeth than any other one material in our hands, it is important for the dentists to know the metals that go to make it, and how they will behave in the mouth. When I read Mr. Atkinson's paper in the *Dental Cosmos* (issue for June 1913), while I am not a metallurgist, I thought that we had all been wrong, and that it had all been fixed for us—that the making of dental alloys was simply a chemical proposition; and here again we owe Dr. Ward a great vote of thanks. For if the manufacturers had gone into making amalgam on the laws of valence as suggested by Mr. Atkinson's article, we should have had very unreliable amalgams indeed. So the problem is not so simple as it looks. These alloys are curious things, the union of metals producing a result which apparently does not follow the laws of chemistry or physics, and we are not yet ready to depart from the rules laid down by Dr. Black. My particular part in the discussion has to do with the behavior of these metals in the mouth, and is based upon studies regarding the action of saliva on German silver, gold and platinous zinc alloys, which I reported some years ago. I recognized the value of zinc from the physical standpoint in small proportion as a good constituent in these alloys, and, if the proportion be small enough, I may agree with Dr. Ward, but I have an animus against the insertion of zinc in any percentage in the human mouth.

Allow me to quote from my former paper:*

> If it can be established that a vitiated saliva, or even a normal saliva and its mucous content, or the decomposition of food in the common retention centers, or a combination of all of these, affect the metals in use in operative and prosthetic dentistry in such a way as to bring about their corrosion, forming other retention centers to the minute but ultimate destruction of smooth surfaces, prophylaxis exacts of us that we correct the environment, if possible; close all retention centers against the lodgment of filth, or substitute some material impervious to such action.
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> * * * * *
>
> The alloy German silver was found, by six assays of as many varieties manufactured, to consist of copper 6.1, zinc 2.1, nickel 1.7, and iron 0.2. . . . Plain German silver examined with low powers after exposure of a few weeks in the mouth, in child saliva, presented craters in the centers retaining food; on longer exposure these craters extended all over the appliances—an arch bar for instance—even to the parts kept clean by the lips and tongue; corrosion was more pronounced in fixed than in removable appliances, and distinctly more violent and rapid, even to perforation of the metal, when gold plating, which was always defective, occurred.
>
> That the added layer of gold should greatly increase corrosion, even granting some damage to the alloy in plating, is significant when seen in the light of the table of Berzelius, gold and copper standing as highly electro-negative, as opposed to nickel, zinc, and iron, which are electro-positive.
>
> It was found that the craters were cut in the food-retention centers just as the tooth was cut, but there the analogy ceased; for to conclude that this is an acid process *per se* is to admit either that the acid starting craters extends and is retained all over the appliance, even at the constantly cleansed spots, or to admit a general mouth acidity as high as the retention centers—a position entirely untenable, for all children wearing

* *Cosmos*, vol. li, p. 1041, September 1909.

appliances do not have hyperacid mouths, while the corrosion of German silver is remarkably constant in all mouths.

Electrolysis is, then, the principal agent working toward the destruction of this alloy —with the acids of food decomposition first charging the battery, and with the saliva containing these as a general electrolyte. This may be further established by the following facts:

First: An alloy containing, approximately, gold 18, platinum 2, the remaining four parts of the 24 karats being made up of equal parts of silver, copper, and zinc, after short wear under like conditions presents corrosion almost as pronounced as with plain German silver.

Second: "Dutchmen" of German silver wire used to fill in bridge dummies surrounded by gold solder and exposed in finishing, present deep degeneration spots on otherwise smooth surfaces when placed in the mouth away from the abrasion of occlusion. . . .

Last, but by no means least, the study of a large number of 18-karat gold solder surfaces known to have been smooth when placed in the mouth by the writer, develops the interesting fact that whenever a food-retention center was created, as in saddle dummies where gum hypertrophy has produced a false margin, corrosion exists to a marked degree.

Gold solders, "18-karat," are really 16-karat gold, and nearly, if not all, contain approximately, gold 16, copper 5, zinc 3. It has thus been proved that German silver with 15 per cent. zinc, 18-karat gold solder with 12 per cent. zinc, and all below such percentage, and platinous gold alloy with 5 per cent. zinc, all corrode with the human saliva as electrolyte; while gold plates of a much lower proportion of gold, such as coin gold (gold 90, copper 10) and the lower dental plates alloyed with metals all of the same electro-negative class as gold, with copper, silver, and platinum, do not degenerate under the same conditions.

Zinc to the average extent of 5 per cent. is thus the disturbing element, and the following law may be safely deduced: *Metals violently electro-positive and negative to each other should not be used in alloy or apposition in the human mouth, with the saliva as electrolyte*—as, for instance, gold and zinc, copper and zinc, etc.

Corollary to this law stand the facts that it is absurd to spend time polishing surfaces which we are assured will shortly become pitted; that it is bad dental and general hygiene to have such pitted surfaces in the mouth that the degeneration waste metal is ingested continuously, producing possibly systemic detriment; and finally, that because metallic poisoning has not been generally noted, this does not in the least affirm that it has not occurred.

* * * * *

Tin, the principal ingredient of amalgam alloys, when associated with gold cervically as foil, under the influence of the saliva loses much of its physical character and becomes hard and brittle. Binary amalgam alloys (tin and silver) placed cervically as the base for gold foil operations are changed along these lines and to a greater degree. Tin, then, is the active factor, but who will say whether the force acting as to so modify metals is chemical or physical, for these phenomena do not occur outside of the mouth. The quaternary alloys, containing besides the usual proportion of tin and silver a small portion of copper, gold, or zinc, or any two of the latter, do not harden as do the binary alloys in apposition to gold in the mouth; those containing zinc 2 parts show, when placed as a cervical seat for gold foil fillings, corrosion just above the gingival margin. These spots have been found on well-finished fillings from the hands of careful operators, and have been produced experimentally in the mouth by the writer.

It may be noted that as far as these observations go, ternary alloys (respectively silver, tin, and a portion each of copper, gold or platinum), while covered with sulfids, do not show degeneration as do the cleaner-looking quaternary alloys having a small percentage of zinc, with gold or platinum (the writer does not take the latter any too seriously). This is of particular interest, first, because mercury, silver, copper, and tin, the metals common, in the order named, to amalgam alloys, occupy a central position in the series of electro-positive and negative substances, being almost equal in potential, while gold and platinum are as far away and opposed electro-negatively from this naturally com-

bined central group as is zinc electro-positively; second, these four metals combined have long been known as producing the best practical results.

I am not at all clear as to the percentage of zinc Dr. Ward proposes, and I do not understand how it can exist independently in bulk in amalgam alloys without being dissolved out, when we know that German silver, which is a homogeneous zinc alloy—as proved by the fact that it is so often used as a resistance in reducing electric currents, —will degenerate in the mouth, as has been shown.

Dr. Hamilton. I wish to congratulate Dr. Ward on his paper, and I would like to ask how dentists who are not able to make these researches are to know what alloys to use. I have for the last twelve years used alloys made after the Black formula, but it seems that there is some question now as to their superiority. What alloy then should we use? To this question I would like to have some definite answer, if one can be given.

Dr. W. A. Price, Cleveland, Ohio. It is not safe to call upon me while talking of a subject that needs additional research, for I am liable to get my subscription blanks and try to collect more money to help Dr. Ward solve his problem.

I wish to emphasize that, after Dr. Black, Dr. Ward, Dr. Fenchel, or any of our great men, have made their most painstaking and careful researches, they are not in position to advise you to use such and such an alloy—as asked today —because immediately they would place themselves in the position of being partial to certain manufacturers, or are liable to be misunderstood. One of the greatest functions of the National Research Foundation Committee will be that we can bring about a co-operation of such men as Dr. Ward, Dr. Black, and others, and let them come to a conclusion and give us their finding, which we shall accept as final, and so give it to the profession. I have no doubt that before two more annual meetings come around we shall be able to accomplish this aim, if the members of the National Association will make it possible for us to furnish assistants to work under the guidance of these men. I cannot refrain from saying that we have the opportunity now for employing eight researchers if we had the means. I want to commend the work of Dr. Ward, and assure you that when his paper is printed, and we can study it more thoroughly, we will find that it has more of merit and usefulness for our everyday practice than we have suspected from this single reading.

Dr. Rich. I would like to ask Dr. Price to say a word regarding the electrolysis of zinc in the mouth.

Dr. Price. I would hardly like to enter into a discussion of that phase of the subject now, because it would require too much time to offer the premises from which to make my deductions. We should keep in mind the fact that zinc is positive to practically all other metals, and that when we undertake to mix in the mouth different metals of which zinc is one, we are establishing an electric battery. Zinc is always positive, and it has a potential of voltage in proportion to the electro-positive relation to other metals of the series. If we had zinc and platinum in the formula suggested, we would have a very strong battery; when we use zinc with tin, we have a weak battery. When we use a comparatively high percentage of zinc

in one cavity, and gold in another, we have an ordinary battery with a potential of one two-hundredths of a volt, and an amperage capacity according to the size of the filling that will by measurement run as high as one-twentieth of an ampère. When we put that amount of current through vital tissue—as is the case when we have gold on one side and zinc on the other and they are in a united electrical circuit through the dentin of that tooth and through the tissues carrying blood—immediately there will be irritation of the pulp, which has many times to do with the deposit of secondary dentin and the ultimate destruction of the pulp, with a reflex irritation without a local irritation.

Dr. DANIELS. I would like to ask if the saliva, after the filling is inserted, interferes with the union of the mercury and the metals?

Dr. WARD (closing the discussion). I will discuss the last question first. Generally, it is considered that moisture makes no difference, and I think that if the mass of amalgam is not chopped up badly, this is very nearly true. We cannot dispute the fact, however, that saliva between particles of alloy acts as a foreign body, and prevents the intimate contact necessary for the best strength. If, however, the saliva is simply allowed to come in contact with the surface of a filling after it is inserted, I believe that any possible action between salts in the saliva and the amalgam will be limited to the surface of the filling. I think it is quite likely that if there were any action between the substances in the saliva and the amalgam, it would be greater while the amalgam was setting than after it had quite fully set.

Dr. Grieves and Dr. Price have each pointed out some objections to the use of zinc in the various ways in which it is being employed by dentists, Dr. Grieves placing special emphasis upon the difficulty in alloying zinc perfectly, and Dr. Price mentioning the electrolytical properties of this metal. Dr. McCauley and Dr. Bliss have each condemned the use of zinc, apparently upon the opinion of Dr. Black that it does not alloy perfectly, and Mr. Atkinson seems to have condemned it because it did not alloy perfectly and because it did not work in well with his hypothetical alloy Ag_2SnCu. I am willing to admit that many of these arguments would hold true if we were considering zinc alone; but why treat zinc as an individual metal, when we are discussing alloys, any more than we would silver? We can point out some objections to silver if we desire to do so, but no one seems to think that there are any reasons why it is not desirable. The same may be said of copper, and of tin. It is true that we may expect the behavior of zinc alone to be imparted to the alloys of which it is a part, but we must consider it in the ratio of approximately 2 parts of zinc to 198 of the other metals, and the question at once arises, Is zinc one of the controlling metals in such a minute quantity? In view of the evidence, we must answer, No. It is a modifier of a well-balanced alloy, imparting to it what appears to be its tendency unalloyed to form light-colored salts—when it forms salts at all—and to improve the consistence of the amalgam mass while combining the alloy and mercury. These modifications must likewise be considered in approximately the above-mentioned ratio.

Dr. Grieves says that he is under the impression that I favor the use of zinc

in alloys. I want to modify that statement a little by saying that I am not ready to condemn it until we have more evidence that it is detrimental to our alloys. We seem to agree that the use of zinc in as small quantities as now employed, 2 per cent., facilitates amalgamation, the result being long expansions. We also seem to agree that the use of zinc in the quantities mentioned results in a better-colored filling, in most mouths, after it has been in for several years. I believe that most of those who condemn zinc will admit that it will take at least five years for a properly manipulated filling to have its usefulness destroyed by the expansion which they attribute to zinc. The question, then, for us to consider before condemning zinc, is, Which of these properties is of most value? My personal opinion is that the profession has reached a point where it will no longer tolerate black fillings in most of the places where they are required to insert plastics, even though they know that the black ones remain longer useful. Those who are now unconditionally condemning the use of zinc seemed to give the impression that the present methods of handling the metal were in a state of perfection, and that nothing more was to be expected in this phase of the work, but with this I cannot agree.

The real objection to the use of zinc in alloys for amalgam is that those alloys containing it seem to expand more than most of those without it, and my attitude is to control these expansions by more intelligent manipulation—if the manufacturers are unable to control them in the manufacture of the alloy—and by so doing avoid taking a step backward to the alloys of forty or fifty years ago, many of which were as black as coal in some mouths.

The latter part of my paper has to do with a problem which the profession has been confronting several times—viz, Are alloys made by combining the constituents in atomic ratios more desirable than those made otherwise? I think the paper is evidence enough that there is little basis for the assumption that they are.

In closing, I will say that I think there is no mistaking my position regarding the publication of results that are detrimental to our very best manufacturers.

Section I then adjourned until a later session.

THURSDAY—Second Session.

The second meeting of Section I was called to order on Thursday evening at 8 o'clock by the chairman, Dr. Harry E. Kelsey, Baltimore, Md.

The first order of business was the paper by Dr. J. L. Howell, Denver, Colo., entitled "Crown and Bridge Work, Past and Present," as follows:

Crown and Bridge Work, Past and Present.

By J. L. HOWELL, D.D.S., Denver, Col.

THE ideals of yesterday are the realizations of today, and the ideals of today must, and will, be realizations of the great tomorrow.

We are standing upon the threshold of a new epoch in dentistry, with its apostles of new and progressive thought, who have the power to catch and hold the attention of the money-mad public —Dr. Evans teaching and preaching and driving an unthinking public to give more thought and attention to oral hygiene and general sanitation, while that valiant and renowned philanthropist, Mr. Horace Fletcher, the layman and the apostle of right living, by teaching us the value of proper foods and how to masticate them, has done our profession a great and lasting good indirectly by teaching the general public the necessity for good dentistry, that good digestion and good health may follow. Such men as these have helped to start the general public to "thinking dentistry."

HIGHER STANDARDS OF DENTISTRY IMMINENT.

At this time let me sound the warning that owing to this oral hygiene and oral prophylaxis education which the public is receiving today, the people tomorrow will ask and demand of us a better and more prophylactic dental service, demand that the dentist be an oral surgeon, an artist, and a mechanic all in one, and that he be able to "stand to and deliver the goods."

And when that tomorrow arrives the dentists will have discarded the practice of inserting the ill-fitting crown with its projecting band and the unfinished filling with its overhanging ledge and unpolished wall. He will have discarded the old idea of non-devitalization of the pulp in crowning; the "no cure" idea for pyorrhea alveolaris, the "too young" idea for the regulating of children's teeth, and the practice of promiscuous extraction in orthodontia, as well as many other ideas and practices that are prevalent today, but which are fatal to good dentistry. In that junk-heap of discarded methods and ideas will be found the old, filthy, microbe-breeding stationary bridge. Instead, we shall see the dentist who takes pride in his work, loves his profession, and is ambitious to *best* serve his patients, making and placing the removable prophylactic molar and bicuspid bridge, a removable bridge, more simple and easy of construction than any we have now. This, I hope and feel sure, will be perfected in the next few years.

I wish to call special attention to the fact that now all of our time and skill is spent in trying to duplicate nature in her best and loveliest design, in restoring the usefulness and esthetic beauty of diseased, broken-down, and lost teeth. And to that usefulness and beauty the dentist of tomorrow is going to add prophylaxis as his standard of requirement.

A dentist cannot possibly serve his patients well unless he understands the

underlying principles of crown and bridge work and puts these principles into practice. The dentist who falls a victim to the temptation of taking short cuts in order to hurry his work—and it is difficult sometimes to withstand that temptation—will fail to achieve the best results for his *clientèle*.

PREPARATION OF TOOTH FOR A CROWN.

I dare to assert that there is not a dentist who has not heard, time and time again, in his college course a description of how to prepare and crown a tooth, yet for the benefit of those who may have forgotten, I will hurriedly call attention to the essential requirements that are necessary in preparing a tooth for a crown. The first requirement, of course, is devitalization and filling of the canals; the second requirement is adjusting of the band; the third requirement is contour of the band; the fourth requirement is contact and occlusion; and, in crowns for any of the anterior teeth, we will add a fifth essential requirement that must be considered from an esthetic standpoint—and that is, form and color.

DEVITALIZATION DEMANDED.

There was a time when the majority of the dental profession thought it a crime to destroy the pulp of a tooth for crowning purposes, and even today some so-called good dentists are of that opinion. But to me—and I believe that I am backed in my opinion by the very best men in our profession—it seems a blundering mistake if one fails to remove the pulp and to fill the canals to the very apex before the crowning of a tooth. It is sometimes necessary to cut the crown almost entirely away in order to get access to the crooked and irregular canals. In such cases it is advisable to have an X ray made, which I find a great help in speeding my work, with a certainty of success. I feel that it is imperative, before setting a bridge, to have a skiagraph made, to make sure that the canals are filled to the apex.

REMOVAL OF ALL ENAMEL.

The second step in the process of making a crown, after filling the root-canals, is to remove every vestige of enamel from the root, using carborundum stones, sandpaper disks, and enamel cleavers, as the aim is to build a crown that will duplicate the original, natural enamel crown. After the enamel has been entirely removed from the tooth, the greatest circumference of the tooth will be found to be about one-sixteenth of an inch under the gingiva, or at the line of contact between the enamel and the cementum. From this line toward the occlusal surface or edge, the diameter of the dentin diminishes, and the enamel increases in thickness.

DOUBLE BANDS SUGGESTED.

The fitting of bands for molars so as to get a proper fit and to keep it while contouring the bands for excessively bell-shaped teeth, is one of the two original ideas I have to present in this paper —that is, they are original as far as I know.

The great trouble I had up until a few years ago was to get the band to fit and at the same time have the proper contour at the gingival margin. As a rule, it had the reverse contour; that is, it fitted and paralleled the dentin of the tooth, but did not protect the delicate membrane of the gingiva because it did

not have the proper contour, and if I gave it the proper contour it was too uncertain in putting on and off. But after repairing a poorly fitting but well-made bridge by removing the enamel from the abutment teeth and making a narrow band for the abutment roots, contouring the gingival portion of the bridge abutment crowns, forcing the bridge crowns down over the new band that I had made for the abutments, I found that I had a beautifully contoured and well-fitting bridge, and after soldering and polishing I was so well pleased with the fit and contour of the crowns that I have used that method for fitting and contouring all gold crowns I have made since then.

ADJUSTMENT BAND.

The technique is as follows: The first band, which we will call the inner or adjustment band, should not be over one-fourth of an inch in width, unless the festooning of the gingiva is decidedly marked, and should be cut from 30-gage plate. The band is to be a trifle short of the measurement of the tooth under the gingiva. In taking the measurement, I use the Hollingsworth copper strips, as they can be forced up under the gingiva better than wire or waxed floss. One end of the band is filed to a knife-edge thinness, the other end is lapped over, with the knife-edge end on the inside, and the band is soldered with a very small amount of 22-karat solder. This band is then forced over the prepared root down to the gingiva with a sharp instrument, and the gingival line is marked upon the band, mesially, distally, buccally, and lingually. The band is removed and trimmed as marked, is replaced on the tooth, forced down over the tooth until it extends under the gingiva a little less than about one-sixteenth of an inch, and then burnished to the walls of the tooth. If this has been done properly, the band will be greater in circumference under the gingiva than at the occlusal end—in other words, it will be slightly cone-shaped. Then, with a sharp instrument, the gingival line is marked on the band, an impression is taken, the band is removed from the tooth, placed in the impression, and a model is run and finished in the laboratory. As I said in the beginning, the second essential principle to be considered in making a crown is to fit the adjustment of the band, and now we have the adjustment band on the plaster model.

CONTOUR BAND.

The third requirement that is absolutely necessary to be considered in the making of a perfectly serviceable crown is contour. It is as essential that a crown should have a perfect contour as that it should have a perfect adjustment at the gingival margin. The first is necessary to prevent irritation to the gingiva, the second to prevent the food from crowding down upon the gingiva and starting an irritation that so often leads to that dreaded disease, pyorrhea alveolaris.

To obtain a good and sure contour, a measurement of the band on the model is taken at the gingival line, and the band width is cut so as to bring the band buccally and palatally to one-thirty-second of an inch of the cusps of the occluding teeth. This band we will call the outer or contour band. It should be cut so that it will have a greater circumference at the occlusal

edge than at the gingival, that is, in large bell-shaped molars. One end is filed, lapped and soldered as was done with the inner or adjustment band, using a small amount of 22-karat solder. The contour band is returned to the model and contoured as desired, using spreading and contouring pliers for the purpose, so that the band assumes the proper curves and angles labially and lingually, also insuring perfect approximal contact. The rest of the crown can be finished after any favored method, either by carving the cusps in casting wax, casting and soldering the cast cusps to the band, or by carving the cusps in a metallic carving compound and swaging them in 32- or 34-gage pure gold plate, using a coat swager with soft rubber between the gold plate and the plunger. The cusps are flowed flush with 22-karat solder, or with 22-karat gold, or coin gold, and soldered to the band with 18-karat solder. The crown is then polished, feather-edged at its cervical margin, gold-plated, and well burnished.

All crowns and bridges should be gold-plated before being cemented into place, except the split posts, tubes, and telescope parts in removable bridge work, to prevent unsightly oxidizing of the soldered parts as well as to cover up the cadmium in the solder, which some authorities claim to be poisonous to the system.

By following the method described, a crown is obtained that will always go to place without any danger of the band stretching and going too far down under the gum and impinging upon the gingiva, thereby starting future trouble for both patient and dentist. Such a crown will hold without risk of breaking or tearing, and will bear the greatest amount of stress and strain when used for abutments in Morgan, Roach, or Gilmore bridge and plate attachments.

There is a great variety of factory-made or "ready to set" crowns on the market for the anterior teeth, and I am sorry to say that they seem to be most universally used. But for fear of exhausting your patience, and out of charity, we will refrain from commenting upon their use.

I have never become a convert to the theory that a cast adaptation crown is as satisfactory as the banded Richmond crown or the banded baked porcelain crown. For insuring the greatest efficiency in anterior crowns, no crown made with cast adaptations is equal to the crown made with the band, cap, and post. While the bands are difficult to fit and take more time, perseverance, and skill, yet in the end it pays to employ this crown, owing to the protection offered to the root against fracture and against the micro-organisms of the mouth.

FITTING BANDS FOR A RICHMOND CROWN.

The many failures with the Richmond crown are due to the fact that the proper technique of fitting the band is not followed. Teeth, as before stated, as a rule are slightly conical in shape when the enamel is removed. Therefore, in order to obtain a band that will have the same contour as the enamel portion that extended under the gingiva, we have to be very careful and painstaking in our technique. I do not believe that there is any branch in dentistry where a man's skill and patience are so severely taxed as in the making and fitting of a Richmond crown. The technique of making and fitting a Richmond band is as follows:

The tooth is ground to within $\frac{1}{8}$ of an inch of the gingiva labially, and not nearly so close palatally, the measurement taken, a band is cut a little short of the measurement, fitted to the tooth, and festooned so that it will go up under the gingiva less than one-thirty-second of an inch. The band is then removed and feather-edged with a file and burnisher, making sure that it is festooned sufficiently mesially and distally. Then it is replaced on the tooth and forced down so that it will stretch enough to extend under the gingiva a little less than one-sixteenth of an inch, at the same time becoming slightly conical in shape. While the band is on the tooth, the labial portions of the tooth and band are ground with a round carborundum wheel even with the gingiva; then, with a homemade instrument that is bent and ground so that it takes on the curve or festoon of the buccal portion of the gum and is so made that it will fit the neck of the tooth, the gum is held down and out of the way so that the carborundum wheel will not lacerate it. The band and tooth should not be ground down over one-sixty-fourth to one-thirty-second of an inch below the gum line. Before removing the band, a piece of pure gold plate, well annealed, and a trifle larger than the occlusal surface of the tooth, is burnished over the end of the tooth and band, the band is slipped off, the piece of pure gold is re-annealed, fitted closely to the band, and soldered. The cap thus obtained is replaced on the tooth, an impression is taken, and the crown is finished in the laboratory. As I said before, in my opinion the shortcoming of the Richmond crown lies in the lack of *adjustment* and *contour* of the band. Therefore, after running a model and placing it on an articulator, a facing is ground to fit the cap with a perfect joint, and backed with pure gold or platinum foil, or both, as the case may demand. In about fifty per cent. of cases I find that it is necessary to use both platinum foil and gold plate, 36-gage, in backing facings, using the platinum foil to back the occlusal or cutting half, to give the facing its natural bluish tinge, while the gold is necessary to give a yellowish tinge to the gingival third.

For contouring the band, the facing is waxed to the cap, allowing the facing to stand out over the edge of the band from about one-third to one-half of the width of the band labially. Upon removing the appliance from the model, a V-shaped space will be noted between the labio-cervical margin of the facing and the band. This V-shaped space is filled with very narrow strips of pure gold cut from 34-gage gold plate, and so narrow that it practically becomes gold wire; this is covered with Parr's hard wax flux, invested, and soldered. The solder will follow the pure gold strips and a band perfectly contoured labially, mesially, and distally is obtained. Before taking the crown from the investment, two pieces of 30-gage gold plate are placed upon the palatal portion of the band so that there will be plenty of gold on the band to give the crown, when finished, the proper contour on the palatal margin, as well as to impart to it the additional strength needed for the prevention of root fracture.

REMOVABLE VS. STATIONARY BRIDGES.

Practitioners today seem to make too many stationary bridges and too few removable or prophylactic bridges. The

one great fault we find with the stationary molar and bicuspid bridge is the filthy, germ-breeding, odoriferous existence it leads. Only in rare instances do we find a mouth with long slender teeth on which a serviceable prophylactic stationary bridge can be placed. How often do we find cases in which the conscientious dentist, in his anxious dilemma, has compromised and put in a half-serviceable, half-sanitary, stationary bridge, making the molars only one-half to two-thirds as wide as they should be, and calling this a sanitary bridge—and "letting it go at that"—because that seemed to be the best he knew.

The one permanent or stationary bridge that is being used extensively and is commendable, in that it is artistic, serviceable, and comparatively sanitary, is the cast inlay abutment bridge used for canines and centrals, also for bicuspids and molars where there has been considerable absorption from pyorrhea. One reason why I think we like this type of bridge is because all of us can make a more perfect inlay in less time than it takes to remove the enamel from a central incisor and fit a band properly. In this, however, as in every other branch of dentistry, there are bound to be a great many failures by men who are honest and sincere, yet who have not a sufficiently mechanical turn of mind to know or properly judge where such bridges are indicated, how much stress and strain will be brought to bear upon such a bridge, and how much it will stand.

TECHNIQUE OF MAKING INLAY ABUTMENTS.

As to the technique of making an abutment inlay, it is important to have the inlay cover the whole of the occlusal surface of the tooth if the abutment is a bicuspid or canine, thus preventing fracture of the tooth. The cast gold inlay alone must not be depended on for strength, but an iridio-platinum wire must be used for a post, which is set deeply into the canal and bent at right angles so that it will not interfere with the articulation of the occluding teeth. The cavity is filled with inlay wax, so as to cover the iridio-platinum post. The inlays are cast and replaced in the cavities, an impression is taken, models are made, and the bridge is finished in the usual way, excepting the soldering process. It is necessary to invest and solder twice in making a cast inlay abutment bridge, on account of the contraction of the solder when changing from the molten to the solid state, while in making a crown abutment bridge it is only necessary to solder once.

I am especially partial to the removable bridge, using the Peeso removable attachments. These abutment attachments are the telescope crown and the split pin and tube, which are used for the lower bicuspid and molars separately and in combination. The telescope crown is what the name implies, viz, the telescoping of one crown over another with such fine adjustment that the capillary attraction holds them together rather than mechanical friction.

The split pin and tube are used in conjunction with the telescope crown, also for the anterior teeth when we use porcelain facings.

The most satisfactorily artistic as well as prophylactic bridge is the removable bridge having as attachments the split pin, tube, and cast inlay abutments.

Discussion.

Dr. M. E. Vance, Omaha, Neb. The essayist of the evening has given us a dissertation on the ideal in crown and bridge work, but how many of us follow that ideal? There is no need of my enlarging or commenting upon the essentials for successful crown and bridge work which the essayist has outlined, but I wish to urge greater adherence to these essentials. All that Dr. Howell may say of better crown and bridge work will not benefit us unless we put his suggestions into practice. Many practitioners attend dental meetings and witness clinics and demonstrations of how best to prepare teeth for the insertion of crowns and bridges, and yet they continue to do the work in the same manner as before, which I am sure is not proving satisfactory to themselves or their patients. This is a rather severe commentary on the dental profession, which claims advancement and progress. Yet how many mouths contain dental work which makes us almost blush for shame!

It has been my pleasure since coming to Kansas City to know Dr. Howell personally, and to discuss with him in detail the manner in which he constructs bridge work. I question whether any of you could follow the essayist's short description sufficiently well to be able to construct this work in the way he does. I have received a great deal of benefit in this direction from a study-club to which I belong, where we spend two or three days in going over some special class of work. For instance, at one meeting we study amalgam fillings, at another the construction of crown and bridge work, and at another plate work. Some fifteen or twenty of us get together, discuss these subjects and do the actual work in the mouths of patients provided for us. In this club there are a number of competent demonstrators.

When in college we were supposed to work in an ideal way, but most of us were hardly able to do what we would today consider ideal in any line of work when we were students.

I wish to say a word about the porcelain crowns—such as the Logan, the Twentieth Century, or the Davis crown—the application of which Dr. Howell does not favor, preferring the Richmond crown to all these. With the Logan crown or the Twentieth Century crown I have been very successful in reproducing the natural tooth. I rarely construct a Richmond crown, because I feel that it is almost impossible to overcome the irritation around the gingival margin. I had the pleasure of seeing this afternoon some beautifully constructed Richmond crowns made by Dr. Howell, but the great amount of irritation which I have seen from time to time, due to poorly constructed bands of Richmond crowns, has led me to feel that the great majority of dentists are either not capable or not willing to properly construct such a piece of work. Unfortunately, I have seen a great deal of porcelain crown work which is neither creditable to the operator nor the dental profession. But with proper care and technique, and if a man has any ability at all, it seems to me that he can adjust a porcelain crown to the root of a tooth and make a margin that is far better at the gum than a gold band. Moreover, the color change produced by gold or platinum in the facing is nearly always detrimental. I do not think it is possible to obtain as good color in a Richmond crown that is backed with gold as in an all-porcelain crown. The contour

of the crowns that are on the market today will fill the needs of almost every case. To be sure, there are difficult and almost impossible cases which it seems impossible to remedy with anything, but in the great majority of cases I think the porcelain crowns we buy are far better than the Richmond crown. The majority of dentists, in my opinion, are not able to bake porcelain crowns that are equal to those of the manufacturers.

In the preparation of the roots for crown work, the enamel cleavers for the four corners of the tooth, if I may so express it, are very essential. The four sides of the tooth can be ground off with stones of different kinds, but the four corners of the tooth are too often neglected, and if these corners are left untrimmed, a band extending under the gum is sure to cause pyorrhea alveolaris sooner or later.

I wish to say a word in behalf of the cast abutment for bridge work. It seems to me that the saving of tooth structure which we are able to accomplish today with the cast inlay as an abutment argues well for its employment. In years gone by we had to make either porcelain or gold crowns for these abutments, but today we can extirpate the pulps and save practically the entire labial surfaces of bicuspids and canines, if we employ the cast inlay.

Fixed bridge work has been unsuccessful because we have tried to make crowns over teeth without first paralleling the walls of the two abutment teeth.

Dr. J. K. Will, Bonner Springs, Kans. In regard to the Richmond crown, the last speaker said that we cannot obtain the proper color. But, if the gold is held behind the facing and allowance is made for the changes of the shade, the shade will be exact.

In grinding Logan or Twentieth Century crowns I find that by using articulating paper I can obtain perfect adaptation to the roots.

As to the questions of paralleling the abutments for bridges, we can usually get the bridge in place, even if the abutment teeth diverge somewhat.

Dr. J. H. Blachly, Manhattan, Kans. I would like to say a word in regard to the cast joint. If a patient presents a badly broken-down joint which it is impossible to correct by means of the Richmond crown, a solid crown can be obtained by the careful use of the cast joint between the porcelain and the root, especially if we use a detached post, thus getting a result that is esthetic in appearance and will be of great service to the patient.

Dr. J. V. Boswell, Springfield, Mo. Several years ago I favored the use of the banded crown, but have come to the conclusion that a properly inserted all-porcelain crown is the acme of perfection. The trouble encountered with non-banded crowns in a great many instances is due to the careless way in which they are set. In the Logan crown, for instance, we recognize that the pin is rather too soft, but it has the advantage of being made of a noble metal, and unless the root-canal has been unduly enlarged, it will stand in most cases. My method of setting the Logan crown consists in using the Ivory No. 9 clamp and, with a rubber dam on the root, grinding down the stub as desired. In this way I can almost perfectly fit the joint. One great trouble in setting a Logan crown, or any all-porcelain crown, is that we leave the back of the root too low. Of course it is necessary to cut the labial portion high enough to hide the joint; the joint should not be

left exposed behind, but the face of the root should be given a slant, which will offer resistance to any force that is brought to bear upon the crown. That is, the face of the root and the base of the crown should be shaped and fitted at as nearly a right angle to the direction of stress as possible. Then the stress will tend to force the crown toward the root, instead of away from it. If a clamp and the rubber dam are used, the field of operation is clearly visible, and the operator can see what he is doing. I do not believe it is possible to have an anterior banded crown remain in the mouth any length of time without producing an untoward condition of the gum. In bridge work, of course, we are almost compelled to use banded crowns if we want permanence, and we have to choose the lesser of two evils. If the abutment teeth are converging, I do not believe in placing a removable bridge of the type described, for an ordinary fixed bridge can be made and placed in most of these cases, if the abutments are properly prepared.

Dr. N. C. Christensen, Omaha, Neb. With regard to the banded crown, I do not think it necessary to allow the band to extend up to the alveolar process, if the root is properly prepared, and this I consider a very necessary feature for the success of the crown. In some cases which I have observed, the root had been crushed and the mesial portion pushed off, presenting a condition which is very difficult to repair. A band properly prepared with good judgment is, in my opinion, a good appliance in such complicated cases.

The color of a Richmond crown can be preserved for many years, if the gold is properly swaged against the facing so that no moisture can get in. I have several patients in whom such crowns have been standing as long as eight and nine years. If necessary, the color can be modified by using platinum. It is desirable that the manufacturers supply us with teeth of natural color, which can be changed to a deeper shade by proper backing.

Dr. W. S. Zeile, Sydney, Australia. I am making removable crown and bridge work successfully, and am glad to see that in the seven years, since I was last in this country, the methods have not been changed in any particular detail. I find that the split pin is of very little value for the purpose for which the essayist uses it, and I would like to ask how he spreads the pin in the center without disturbing its fit, and without spreading the end of the pin that first fits into the tube?

Dr. F. H. Skinner, Chicago, Ill. For hygienic reasons, I believe, we must avoid large fixed bridges. The method which Dr. Howell has described this evening is one of the most perfect methods of removable bridge work that we have, but I think it has a few objections. Dr. Howell, you introduce a tube into the root-canal and run a split pin into the tube, do you not?

Dr. Howell. Yes.

Dr. Skinner. I think the objection to this procedure is the trouble encountered in enlarging the root-canal in most teeth to accommodate a split pin and tube without weakening the root. For this reason I have, for some time, soldered to the abutment a nut or tube threaded on the inside, and screwed a split pin into this tube, allowing a platinum tube to go over the pin, and building the crown around the tube. I prefer the use of split pins to telescoped crowns for the attachment of removable bridge work,

for they can be tightened if necessary, and better cosmetic results can be obtained; also, if one side of the split pin should break off, the pin can be unscrewed and replaced without any trouble.

Banded crown abutments add strength to the roots and form firmer attachments, but unless the root is very conscientiously prepared, the band accurately fitted, and the crown contoured so as to protect the soft tissue, irritation will result.

Dr. J. F. Wallace, Canton, Mo. From the discussion it seems that we have no fixed rules for making a crown or bridge. The conditions under which we must do the operation, and under which the crown or bridge must stay, must be taken into consideration, if the appliance is to be a success. A crown or bridge that may be a success in one instance may probably be a total failure in another instance, and it is the operator's duty to study the conditions to which the appliances must be adapted, and under which they must remain in the mouth. We cannot possibly be successful if we confine ourselves to any particular form of construction of artificial substitutes. The banded crown may be ideal in one case, but an absolute failure in another. The audience seems averse to the banded crown, but there are cases in which it is fully indicated. Someone mentioned the case of a badly decayed or crushed root, and suggested that, in order to remedy this, a band must be made to extend beyond the decayed margin. In such a case a cast matrix between the root and the crown is indicated. After all, the operator's gumption in studying conditions and reaching conclusions is the most important factor.

Dr. M. T. O'Neill, Vienna, Austria. Dr. Bryan of Basel, Switzerland, has devised a very satisfactory method of removable bridge work, which consists in attaching the bridge to its abutments by the use of a screw. This method has been described in dental journals several times. It is especially adapted to teeth in which we have to restore a certain portion with porcelain. The bridge can be easily removed and cleansed, and, if the porcelain breaks, a great variety of facings are available for repairing it.

The essayist's description of his bridge work is very instructive. The split pin, on which several of the speakers have been commenting, I have seen in a great number of cases, but have found very few in which the elasticity of the material will last over a few months,

As to the banded crown, I think that the majority of dentists do not use enough pains in fitting the band. We must not forget that, if we allow the band to encroach on the tissues, inflammation will ensue. Probably the only way to avoid this is to be sure that the circumference of the band is not larger than the original circumference of the tooth. It takes a great deal of pains to do this work, but, if properly executed, it will repay us in the end.

A Member. I have been waiting to hear something said about the essayist's method of contouring the band so as to restore the contour of the enamel that has been removed. In a banded crown, that is, I believe, one of the most important features, next to the fitting of the band on the root. We should aim to fit the band to the root as we fit a hoop to a barrel—in contact everywhere. I do not, however, believe that it is absolutely necessary to use a band to prevent the splitting of the root, especially in the six anterior teeth. In these cases, I firmly

believe, the porcelain crown with the cast base is the most suitable. This crown will produce less irritation of the gum tissue than a banded crown, no matter how carefully the band is fitted. In order to prevent the root from splitting it is necessary to put the strain on the lingual side of the root. This can be accomplished by cutting a square in the lingual side and making the casting so that it fits well into this square. Any force exerted on the lingual surface of the crown will then be thrown to the lingual surface, and splitting of the root is prevented much more successfully than by any band.

Dr. Howell (closing the discussion). I wish to thank the audience for the consideration, criticism, and extended discussion accorded to my paper. It always seems remarkable to me how much success so many operators obtain from different methods. Each operator obtains better results with his own favorite method than with any other, according to the law of the personal equation. I am partial to the Richmond crown, because in my hands it has given so much satisfaction. I have been trying to learn other methods, in order to obtain results with the least expenditure of labor. I have been trying the method of casting the joint, but have never yet been able to make a joint without a cleft, and such a joint cannot be kept absolutely prophylactic. I intended to bring with me a three-teeth bridge that I inserted nine years ago, using banded Richmond crowns as abutments, for a patient who since that time has been all over the world. When this bridge was inserted he had four natural teeth left on that side, and was wearing a partial plate. During his absence he lost a central and a lateral incisor and canine, and when, on returning to Denver, he came to me he had only a right lateral and central and two right molars left, which were so loose from pyorrhea that they could almost be removed with the fingers. I remembered having made a note when I inserted the bridge that the two abutment teeth were affected with pyorrhea, as much as the other teeth left in the mouth. Yet after nine years these two abutment teeth with banded contoured Richmond crowns were absolutely solid, although the natural teeth had either been lost by pyorrhea or were hopelessly loose. The patient insisted on having the bridge removed and a full gold plate made. I had intended to show the bridge and the extracted teeth here, in order to demonstrate what a great amount of tartar had accumulated on the four teeth which I extracted and what a small amount on the teeth that had been crowned.

If one can get better results by using the cast gold base, as my friends claim, he should use it by all means, but personally I have never been able to obtain a perfectly fitting cast base for a Logan crown, even if I use articulating paper. Moreover, it takes three times as long to get a perfect adaptation as to make a perfectly fitting band and contour by the method described. The great fault of the Logan crown is not so much getting this joint here [indicating], as in the mesial, lingual, buccal, or palatal joints, because there is always some little overhanging ledge there, which holds food and starts inflammation.

It is true that in many cases the Richmond crown is a failure, but this is not due to the system, but to the mechanism of the finger-tips and to lack of skill on the part of the operator. After twelve years of practice I find this to be the

only system that will universally answer all the requirements, if applied properly. It takes a great deal of time to get good results, however, and many practitioners are inclined to take short cuts. I have seen fifty or more fractured roots on which unbanded crowns had been used, and I object to that form of crown on account of this risk of fracture as well as for prophylactic reasons.

The correct color can be readily obtained, if a facing of suitable shade is selected, and platinum and gold is used for the backing. As a rule I can get as perfect color as with a Logan crown, although I am partial to the Logan crown as far as artistic effect is concerned; but we cannot sacrifice durability to esthetic appearance, although our crowns must be as nearly esthetic as possible.

One of the speakers said that it was impossible to fit a band and not produce irritation of the gum. I wish I could show some of the cases in which I have used the Richmond banded crown. I have had, of course, failures in some Richmond crowns. I have had to remove one or two such crowns when gingivitis was present, and made a banded porcelain crown, allowing the porcelain to extend down over the band, thus providing a heavy band of porcelain, which is, I admit, unsightly when out of the mouth, but when set will allow the gum to remain in a healthy condition. I have inserted many of these crowns in cases where there seems to be some idiosyncrasy of the gum tissue against tolerating gold even when properly burnished.

Dr. Zeile wants to know how the pin is spread. There are two ways of doing this. If the pin is ground off to this point [indicating], and opened with a fine instrument, it will split in this manner [indicating].

Another method is as follows: I do not grind off this little flare [demonstrating], but leave this end of the wire bent and only cut about one-half. In the cases where I have used this method I have had only one bridge come off owing to a spread pin. There seems apparently no wear and tear on these abutments in five and a half years. It seems they hold by capillary attraction. In other words, a certain amount of moisture present does not allow the pieces to come together, and yet there is a better and tighter fit if such moisture is present. The best way is not to grind the pin off here [indicating], but to make the split from here to here [indicating] obtaining the spread from here to here [indicating], rather than at the end.

Section I then adjourned.

SECTION II:

Operative Dentistry, Nomenclature, Literature, Dental Education, and Allied Subjects.

Chairman—J. R. Callahan, Cincinnati, Ohio.
Vice-chairman—Joseph D. Eby, Atlanta, Ga.
Secretary—J. P. Marshall, St. Louis, Mo.

TUESDAY—First Session.

The first session of Section II was called to order on Tuesday afternoon, July 9, 1913, at 2.30 o'clock, by the chairman of the section, Dr. J. R. Callahan.

The Chairman announced as the first order of business for Section II the reading of a paper by Dr. G. S. Junkerman, Cincinnati, Ohio, entitled "Dental Educational Harmony," as follows:

Dental Educational Harmony.

By G. S. JUNKERMAN, A.M., M.D., D.D.S., Cincinnati, Ohio.

I can plainly hear the grunt and see the cynical smile of skepticism on the faces of those, if there be any, who have read the title of this paper, as the conviction reaches their minds that *there is no dental educational harmony.* In others, concern displaces cynicism, as with straining eyes they look and hope for a Moses who will lead the children of Israel from darkness into light. The golden opportunity for bringing the profession into renewed respectability surrounds us on all sides, yet internal contention and civil strife preclude the possibility of presenting to the enemy the solid and uniform phalanx that will attain the ideal goal for the profession and those it serves. I do not desire to censure, but to criticize, and above all, to be truthful as I see the truth. If any are hurt, my justification will lie in the old axiom that the truth usually does hurt, consciousness of which fact will be conveyed to me by the knowledge that,

if a stone is cast among a pack of hounds, the yelp will come from the one that has been hit. Not being, however, of the class who are justified in casting the first stone, nor yet a stranger to the painfulness of the stony impact, I feel that I have learned enough charity to offer myself as "first aid to the injured."

PRESENT DISHARMONY.

The first act of a musical performer is to tune his instrument. When a number of instruments are to be played together, they are tuned to each other from a fundamental note; failure to do so makes an inharmonious and discordant performance, no matter how fine the instruments nor how expert the players. The dental educational bodies of this country are expert players, performing on superb instruments well tuned, but not tuned to each other. The result is a garble of disharmony in which the piteous struggle to reconcile B flat and C sharp creates such a din that everyone finds himself more often in a condition to *be* flat than to *see* sharp. To continue the allegory, it can be said that many are trying to play so fast that we find them a few bars ahead of the rest, in a hopeless state of "innocuous desuetude."

THE DENTAL COLLEGES' STANDARD OF REQUIREMENTS AND ITS INADEQUACY.

The three distinctive educational bodies known as the colleges, the examining boards, and the profession at large as expressed by dental societies, are each full of faults, which they are clanging with bass-drum and cymbal effect, thereby drowning the soft *sympathetic* notes of their *virtuous* strings. The result of the condition is that, although we all love music, we are doing everything not to get it. The dental colleges, through their Faculties Association, originally issued the manifesto that they were the judges of who is qualified to begin the study of dentistry and what should qualify such persons to enter upon its practice. Everybody was satisfied, and accepted the manifesto as law. Did the colleges tune up to the fundamental note? I am afraid not. From time to time, through suasion and threat the pitch was raised, but this was a manifesto not made, perhaps suggested, but rather accepted, by the colleges. Did the colleges tune up to these varying pitches? I am afraid not. There were some half-hearted strains at the strings, but the pitch was wofully flat, and discordant music resulted. I still contend that the colleges are the best judges of the material of which they can make dentists, and a sense of justice forces me to maintain equally and positively that, having issued a manifesto as to the competence of their judgeship, they should have stood flat-footed upon it. When they failed to do so, they lost their prestige. The loss of this prestige by the colleges is not beneficial either to them or to the dental profession generally, for the labor necessary to secure a diploma should be clothed with dignity and significance, which being denied, reflects discredit, from the student body, both upon the college and those who deny such prestige to the degree. The colleges might have regained their prestige if after accepting the new manifesto, they had lived up to it, or, having rejected it, had fought their battle for what they thought was right. Had they lost, defeat would have been far preferable to half-hearted and imperfect acquiescence, which aroused only suspicion

and distrust. The insincerity of the colleges in complying with the preliminary requirements which they had promulgated in large part, or had acquiesced in, may carry some apology from the experience gained in trying to comply with them, and finding in many cases that such requirements were either premature, impracticable, or unjust to students and conditions—which conditions could have only been understood by those who were engaged in educating students for practice in the profession. Much to the credit of the colleges there has been very little *tenable* criticism from any source that has cast discredit on dental education *per se,* although some flings have been made about employing young teachers just out of college, when experience shows that they, above all, are better able to teach because of their more recent and familiar contact with the steps of the profession which older teachers have long since forgotten. It has not been the seed or the fruit, but the soil which was being cultivated that has been brought into question as being productive of high-class professional men. It might be said in explanation of this statement that the unprejudiced part of the profession has been forced to realize that the fruit was divided into first, second, and third class, and that there are consumers for each class. Communities that could not support a first-class man are perfectly satisfied with a second- or third-class man, and would have otherwise to do without any, much to their inconvenience and detriment.

The justice of the 15-unit minimum basis I will neither disclaim nor confirm, but content myself with discussing its features. If colleges require it, or are forced to do so, I contend that they should be permitted to administer it with discretion. All diplomas from an accredited high school do not express an equation. There is 30 per cent. difference between the highest and the lowest, ranging from the student that passes at 70 per cent. and the one that passes at 100 per cent. or thereabout. The same holds good if units are substituted for the diploma. The result is that under this system all students admitted to our dental colleges are not equal, and will be more *unequal* at graduation. This system, furthermore, puts a premium on opportunity, and opportunity is not a common possession. It is more likely to be the property of the rich, and aristocracy of wealth I am unwilling to bow to, unless it be wealth of mental attainment. If a 100 per cent. accredited high-school diploma represents 15 units, then a 70 per cent. diploma represents only 10½ units. A perfect two-year high-school student will have acquired 7½ units, which is only three units less than the record of the man who is admitted unconditioned with a 70 per cent. diploma, yet the conditioned man must make up 7½ units or discontinue his dental studies. Is this equity and justice? Many apt and diligent students are compelled to quit high school for lack of opportunity; then the opportunity comes, and they are denied the privilege of studying their chosen profession, although mentally well able to acquire the requisite number of units by the time that they receive their dental diplomas. As pertains to these ideas, I think that the dental colleges should be allowed to exercise discretion. It also brings into the foreground the potency of the "equivalent," a word which has been much abused, perhaps, but which cannot be eliminated in the face of justice and superior

mental caliber. The blame for not exercising this discretion rests largely on the colleges themselves, because they are not practicing what they would like to exact from others in forcing students to make up their literary deficiencies before they enter the junior class. The colleges claim that only their product and not the raw material should be tested for certificates of practice, but they do not apply the same test to their candidates for diplomas. If they did, students would be given up to the time of graduation to make up their preliminary units as required by the colleges or the state laws. Were this the practice, a premium would be placed on mental capacity, and not on opportunity alone. Many students are bright enough to acquire all the dental studies and a large percentage of so-called preliminary units at the same time, thereby having all the preliminary as well as the dental units by the time they are called upon to use them.

DENTAL EXAMINING BOARDS AND THEIR SHORTCOMINGS.

If the dental colleges are guilty of insincerity, faults, and inconsistencies, the examining boards are no less free from the same undesirable qualities. This applies in many cases to the board member, as well as to the laws as passed or defectively administered.

The dental laws are enacted by the people, and for their protection. The people do not care how many dentists there are; they are only concerned about their quality. If we curtail the number, we create an inequality between the supply and the demand, and the people have to pay the bill by an increase in the price of services. The people are slow to awaken, but when they do, how long will they continue to make dental laws for such an end? and how long will they permit present laws to such an end to exist? The answer is too plain. We are educating the people more now than ever in the needs of dentistry, and they will demand that we give them true exponents of the profession to take care of their needs. The *defective* graduates are not the ones that should be feared by the people. These will quickly recover, or be consumed by the immutable law of the survival of the fittest. It is the *effective* graduate who, to the unwary and unsuspecting, presents a gilded front and an enticing entrance to his office, while in the palatial interior the hopeless victim to false diagnosis and advice of a pecuniary significance gazes from the operating chair upon walls hung with a high-school diploma, and a dental degree, and a highly ornamental state-board certificate. With such a picture as this before him—and there are many—any self-respecting and law-abiding dentist must often address the painful question to himself: Are the present dental laws a success, and do they protect the people? And the answer must be a logical "No."

The examiners should be legalized to examine only the college product in its finished state. This applies to the dental units, and to a simple verification of the preliminary units as a precaution to insure that the colleges comply with their catalog announcements. I think that all states should make or re-arrange their laws to cover completely such a procedure. If the colleges agree to this, and they should, no aspersions on their honesty could be implied, but such a verification would entirely remove any

feeling of distrust, and restore that confidence between the two bodies which has so long been absent. Neither a person's nor a corporation's integrity suffers from investigation and verification of their acts.

Competence in others cannot be judged by the incompetent. The call of justice demands that anyone on trial shall be tried by his peers. The examiner should be as clever as the expectancy of the examined. A shoemaker or a blacksmith *per se* might examine correctly my physical properties, but I should be very incredulous of such men's ability to judge my dental and educational units from the standpoint of their technical knowledge of making shoes for man or beast. No dental examiner should be appointed to such office until he has qualified with at least a minimum of what he expects to find anchored in the brain and fingers of a dental graduate. Without such qualifications he becomes, when endowed with authority, an inquisitor, not an examiner. When we have *examiners* on our dental boards I am willing to be trustful, but apprehension and ridicule vie with each other, dependent on the degree of authority, when inquisitors sit in judgment on our college products. This is the viewpoint of our great student body, and their position in this respect, I think, is impregnable. Executive capacity and worthiness of authority are tested by credentials and examinations in other legislative departments, and there is every reason why our dental examiners should be submitted to the same test instead of to the test of political preferment. I believe that every dental law should contain a clause to compel each examiner to qualify both professionally and preliminarily before accepting his commission; it would insure justice and inspire confidence in the prescribed authority of each examining board. The authority of examining boards over the internal affairs of colleges as pertains to equipment and teachers is a waste of energy and expense. There is a higher power that works through the indisputable laws of the survival of the fittest that will quickly destroy any dental school with inferior teachers and equipment. It is a blessing that the power of wealth and endowment and the power of education are not commensurable. If it were so, many of us would be poor indeed, and education would be at a standstill. The virtue of a dental school cannot be measured by the size of its endowment nor by the number of its students. A healthy midget may triumph over a sickly giant, and the worthy product is all the public want.

The colleges and the examiners should work in harmony. What difference does it make to the public, whom you are supposed to be protecting, when or how education is attained, as long as it is attained prior to the time of using it? The college educators are the best judges of the material that goes to make their product, and if they use material out of which they cannot produce the finished product, they can never "get by" with it, because the examiners need not let them. Such an arrangement would secure high-class men for the profession, and would give the student of ability the chance that had been lost by the lack of opportunity. The colleges would have a larger field in which to exercise discretion, as it would be "up to them" to select good material, giving the student the justice of being judged by his ability instead of by the length of time-sentence to be served.

THE DENTAL PROFESSION'S UNFAIR ATTITUDE TOWARD DENTAL SCHOOLS.

The profession at large, being the third educational body, must come in for a large share of criticism, since by it were created the colleges, the examining boards, and the dental laws which they administer. The profession has taken itself too seriously; the individual members too often become competitors instead of co-operators. Even the commercial bodies of the country are discarding the old idea of competition, and adopting and practicing co-operation as being best for the individual as well as the masses. I am weary and soul-tired of the wholesale condemnation of colleges as practiced by the profession at large. Students want colleges and need them. While in them the student body co-operates, but when they once have received their diplomas, they assume the fierce and narrow-minded attitude of competition, damning colleges as a whole and promulgating theories for curtailing the quantity of their product. Such an attitude is manifest on every side, and if not exhibited in boisterous tirades and false accusations, there is a speak-easy vein in the atmosphere of dental deliberations that forces the conclusion on the college man that he is not wanted or is a drug on the market. Dental colleges bear the same relation to the profession at large that primary schools bear to the high schools and universities. Dental schools are intended to instruct in the discovered and well-established principles of the profession. Since these principles involve so many studies, it is impossible to make experts in any one of them, yet sets of questions are often submitted to our raw graduates that would do credit to the expert if he answered them after having had access to reference books. Dental colleges should not be expected to be research bureaus. They are busy enough when they create the professional dental surgeon. When their students pursue such studies as anatomy, physiology, and chemistry, it is done with a view to making these studies parts of the whole, and not making professional anatomists, physiologists, and chemists. There is a large field for the profession at large to establish research work and advance the principles of hygiene and prophylaxis, and there is a large unpaid debt that we owe our teachers which we can best pay by doing something that will reflect credit upon ourselves. By doing something ourselves, we increase the usefulness of dental schools that have to teach that something to compete successfully with progress. Dental schools can best shine by reflected light, and we are the reflectors.

MORE CO-OPERATION AND LESS COMPETITION WANTED.

If war is hell, then civil strife is the redistilled quintessence of it. Each educational body should attend to its own business. If they do so, they will find themselves too busy to criticize each other. There are bound to be failures, many failures, but the number is no greater in professional than in commercial economics, and we know that the commercial failures run by far into the highest percentage. I realize that it is difficult to reason with anyone who carries an empty market basket and a hungry stomach, but such individuals are usually competitors and not co-operators. I honestly and earnestly hope that the time is at hand when one may walk abroad twanging the dominant

note among his fellow laborers, cherished and respected, and not shunned as if he had stolen something or as if suffering with some contagious disease, because he happens to be guilty of the atrocious crime of being a college man, an examiner, or a dentist.

UNRESTRICTED RECIPROCITY DEMANDED.

As a profession, we have too much to do. We must fight, not each other, but for each other. Accoutered in our uniforms and shining armor and cemented by harmony, we can march to renewed respectability, into the hearts and the very coffers of a suffering public. Instead of expecting alms, we can demand endowments if we but show the public that we are not preying on its misfortunes, but trying to prevent them. We need a national law or an *unrestricted* interchange of licenses. Some of our brethren of the North, in freezing snows and icy blasts, are longing for the balmy air and orange blossoms of the South, yet cannot seek them for fear of the big stick in the hands of some examining board that will prevent them from plying their vocation for a livelihood. Our brethren, too, of the South, worn by labor and care, who might be restored to usefulness by the invigorating air of the North, refuse to come and dwell among us, lest by the same cause they be placed in cold storage.

"MORE PLAY" RECOMMENDED FOR THE INDIVIDUAL PRACTITIONER.

A little educational harmony in the individual dentist would be appreciated by those who are trying to uphold professional dignity. The closeness of application—and necessarily the nervous strain—has a tendency to make of dentistry a somewhat hysterical profession. Seeing things far ahead that never will exist, and combating prospective conditions that never will arrive, has been the labor lost of many an overworked dentist attending our annual meetings, when his only mission should have been the seeking of rest and recreation. Penned up in our little offices where we continuously wield absolutism over our suffering clients, we not only become autocrats, but must necessarily absorb some of the morbid conditions of our environment. Autocracy and morbidity are two very bad lenses through which to view reforms. When we begin to get too strenuous in our criticisms, and alarming views present themselves to us, it is not necessarily time to grab the big stick, and smite some fearful adversary. The fishing rod and the reflections from some placid stream will effectually chase away the bogey man, and relieve the necessity for a murderous assault.

SUMMARY OF SUGGESTIONS OFFERED.

As a general summary to the foregoing discourse, I have the following propositions to offer: Laws to regulate dental practice should not traduce the dignity and significance of the dental degree. They should place their administration in the hands of those best prepared for justice and proficiency, freed from bias and prejudice. They should protect the college, the dentist, and the people from crooked and unfair practices. They should provide for graded certificates of practice, a feature that would give all communities at least a chance to have a dentist; and above all, laws to regulate dental practice should give universal suffrage to all of its practitioners, regardless of state lines. All laws should be protective, not exclusive.

Criticism and not censure has been my

object, that we may secure harmony at any price. If this paper is discussed, I hope that it will be along these lines, feeling confident that, if he that has not sinned throws the first stone, there will be no stones thrown.

Discussion.

Dr. Henry W. Morgan, Nashville, Tenn. The paper to which we have had the pleasure of listening has been very carefully read several times by me, and I feel quite confident that I but re-echo the sentiment that fills the hearts of all present when I say that Dr. Junkerman's conclusions are pretty generally accepted by the profession everywhere—viz, that there should be harmonious co-operation between the profession, the boards of examiners, and school men, and that this would lead to less fear of the adverse criticisms which go forth and poison the minds of the public, doing injury to the profession and still more to the schools. Those who carelessly circulate such reports are lowering themselves in the eyes of the profession as well as in those of the public. This is a plea for harmony; it does not ask for the sacrifice of any principle, but simply for hearty accord and further co-operation, for a full, just and intelligent survey of the problems which are to be solved, and in which each of these bodies we have alluded to have an equal interest.

He who knows the sacrifice that the professional dental educator is called upon to make, and anyone who will follow the history of our dental institutions and but briefly survey them for one moment, knows that they all have the best interests of the profession at heart. We have heard this morning the eloquent address of Dr. Price on the demands that are being made for higher education in the profession of dentistry. How many scientists have we in the dental profession? We cannot hope to make scientists of all our students, but we can impart to them a love of science.

A dental school in order to survive must in the future be a nursery of research. If we do not step in, as Dr. Price has shown us this morning, and assume our part in the responsibility of caring for that branch of preventive medicine which that celebrated surgeon of Chicago said a few weeks ago was the next important domain for the dental profession to occupy, how can we expect to raise any claim for higher professional standing? It rests upon us, and since, as the essayist says, the mouth is the most infected portion of the entire alimentary canal, we shall have to dig deep down into the science that underlies oral conditions, and all schools must become research bureaus.

The *Dental Review* for June published a clipping from the Northwestern University folder enumerating thirty-odd towns that need dentists. No doubt many of you realize that we are not supplying the annual loss of dental practitioners. Unless the colleges are allowed some discretion as to preliminary educational training, and increase the number of graduates, they cannot do justice to the rapidly growing importance of dentistry, and fill the demand for dental services, and soon we shall find ourselves in the embarrassing position depicted by the essayist of this afternoon. What are we going to do? How can we face our legislatures and ask for revised statutes when we know that we are not supplying the demand for dental surgeons?

I do not mean to say that I believe in having no regulations whatever for the

entrance of students into dental schools. In the school I have the honor of being connected with, the university entrance committee passes on all credentials measuring up to the requirements of the National Faculties Association, and these in turn are *visé*'d by the state superintendent. I do believe, however, that we shall have to relax somewhat and supply the demand, else our legislatures may take the bridle off, and pandemonium may result.

I wish to congratulate the essayist on the very forcible manner in which he has presented these questions, and to invite careful reading of the paper after it has been published.

Dr. Chas. McDowell, Rapid City, S. D. In discussing the timely and efficient paper by Dr. Junkerman, I will confine my remarks to the third section of the "inharmonious brass band," as he calls it, viz, the profession at large, to which I belong. Incidentally I may smash a drumhead or dent a cornet in the other section. I played in a band as a youngster and after we had learned to harmonize sufficiently, we went out on the prairie back of the depot and practiced marching, and it is in this very respect that this third section, the profession at large, falls down. We are not in step. Vast numbers of the public have no ear for harmony; but if we make a noise, and keep step with it, they are impressed. Our responsibility is great; we should see that colleges are giving the best that can be given, and that they do not put quantity above efficiency. If a certain standard of education be required for admittance, it should be maintained in all colleges. But the spirit of "getting the money" has not been dormant in these institutions. No school should be run as a dividend-paying institution. The state should back up and control this department, and close any schools that are being run for profit.

It should be a shame that a university dental department, with some of the brightest and best teachers in its faculty, should be closed because it did not pay financially, though every teacher devoted his energy to producing efficiency and turning out graduates that passed various state boards with the lowest ratio of failures.

Dr. Junkerman states that "Much to the credit of the colleges, there has been very little tenable criticism from any source, to cast discredit on dental education," and then goes on to throw stones at the examining boards, stating that they are inquisitors, inconsistent, and the product of political preferment. The profession at large also seems to him to be a mighty discordant group. Now, while we have been hit, let us look at the stone-bruise on the colleges, and then all convalesce together. The preliminary mental qualifications for admission to dental colleges have been stated. Does it not occur to you that there should be some method of determining a prospective student's mechanical and constructive ability? I have known students, as you all have, who have studied three years, and four, and have then been given a diploma, although in reality they were so awkward that they could hardly sharpen a pencil. I believe it will hardly be denied that any graduate of a recognized school can pass the mental or written tests in the state board examinations; the failures are in operative and prosthetic technique.

Let us hasten the time when we can have uniformly controlled colleges, with a national law broad enough to recognize that a man capable of performing

dental service for a citizen in South Dakota is qualified to do the same for a resident of Boston.

I do not quite agree with the statement in Dr. Junkerman's paper that the dental laws are enacted by the people for their protection, and that the people do not care how many dentists there are —they are only concerned about the quality.

It is a fact that, if it were not for some of the progressive, public-spirited dentists that drafted protective laws for the people, a good many states would not yet have examining boards. How many states at present meet the expenses and allow salary enough to maintain a board without the practicing dentists themselves contributing to its maintenance by a yearly diploma registration fee? Though this fee is small, it is wrong. The people reap the benefit, and the state should pay the expense and allow salaries besides.

Another statement in the paper to which I call attention, not in criticism, but in fairness to those examining boards that are free from politics, is this: "Executive capacity and worthiness of authority are tested by credentials and examinations in other legislative departments, and there is every reason why our dental examiners should be submitted to the same test, instead of the test of political preferment."

First: Let me ask how many would voluntarily take those examinations for what glory or salary there is in the position?

Second: State board appointments can be removed from politics by each state society, if the society wishes. As an example, we in South Dakota at our annual meeting select two members of our society, whose names are sent to the governor with the request that one of the two fill the vacancy, and so far every governor has respected our choice. I believe every state society is a good judge of who should be upon the state board. Competitive examinations for dental examiners would be a useful innovation, but the board should be a national one.

I am in accord with Dr. Junkerman as to the lack of educational harmony, and with his permission would like to suggest that the public be included in this educational harmony. The profession at large must assume the responsibility of enlightening the public as to what they ought to expect from us, and of showing them what we are doing for the good of humanity. If we will decide on the noise we must make, and then each enlighten the community with which we come in contact, and keep step, we will be doing part of our share in this dental educational harmony.

Dr. Truman W. Brophy, Chicago, Ill. I very much enjoyed the paper read by Dr. Junkerman. Some thoughts, however, were expressed by him that are not in exact accord with my experiences of the past few years, though I have no reason to doubt that he has some justification for his viewpoint. As far as I am able to judge the conditions of today as compared with those which existed a few years ago, great improvements have been made. I am not in sympathy with the opinion of the essayist, and of the last speaker, regarding the spirit of discord in the profession. There is no profession in which there is such a general feeling of good-will and harmony as exists in the dental profession today.

In corroboration of my statement, look for a moment into the history of medical education in this country and review the literature thereon, especially the reports

of the committee having in charge the work of medical education in medical colleges. Some of you, perhaps, will be surprised when I state that at Atlantic City as recently as five years ago that committee reported that fifty per cent. of all the medical schools in the United States were so ill-equipped and so deficient in their qualifications for teaching, in faculties, buildings, apparatus, etc., that the very best interests of the public would be subserved if that fifty per cent. of the colleges were to be closed by the government or by some power that might be able to do so.

What have we here? I look about and see before me different bodies of men in the dental profession—absolutely honest, I believe, in their purposes, each one doing all that he can to advance the interests of the profession and to guard the interests of the public. Is it possible for one to name a man on a board, a teacher in a dental college, or a member of the profession, who has not the best interests of the profession at heart? Does anyone believe that these men to whom I have referred are dishonest? Do you not believe that each is doing his very best to elevate the profession and care for the people? Go with me to the cities of our country where men have sacrificed almost everything in caring for poor children in the public schools. Point out, if you can, members of any other profession who have done as much in a philanthropic way—and then talk of general discord. I do not know where there is any general discord.

In Chicago three years ago there were three colleges, and we called our faculties together and organized an association of the colleges of that city, with this object, viz, that we might exchange views, might improve ourselves, so that each and every man engaged in dental educational work in that city might profit in such a way as to be able to do better work. In this association there exists perfect accord, and its members have all been greatly benefited.

I would suggest to the gentlemen who have said that there is discord in the profession, to try to have the members of the board meet the faculty members, sit down to a dinner together and discuss the essence of dental education and the aim of the profession in a general way, and I know that they will be able to exchange views in a way that will prove mutually beneficial to all.

There is another phase of the paper with which I do not agree, and that is the suggestion that some men are engaged in educational work for the money that is in it. You all know that the salaries of dental teachers are not in proportion to the amount of time and sacrifice made in educational work. You also know that every man who takes upon himself the great task of the educator is a financial loser. Teachers generally are inadequately compensated for their services. I therefore do not like to hear the author of a paper declare that certain institutions are managed for financial purposes. For my part I would like to see these institutions endowed in the magnificent manner exemplified by the Forsyth brothers of Boston. I would like to see money advanced in sufficient quantity to equip laboratories, and I cannot speak too enthusiastically regarding the work that is being done here today. I do not know how much money has been raised this morning for the purpose of scientific research, but I am sure that it is a considerable sum, and that all the money will be raised that is necessary to equip laboratories for that good

purpose. Then let the boards of examiners, the teachers in the dental schools, and those interested in the progress of the profession, get together and discuss this question in the right spirit and with the determination that there shall be harmony and progress. Then the best interests of the profession will be advanced, and we shall obtain results that no one at the present time is dreaming of.

Nay!—we should not have discord in the dental profession; and we shall not have discord in the dental profession. Harmony must prevail. The magnificent body of men assembled here today must stand as one man, resolved to do the very best possible work to advance its interests. Over the mantelpiece of the Union League Club in Chicago are inscribed these words: "*Welcome to all loyal hearts.* We join ourselves to no party which does not carry the flag and keep step to the music of the Union." Let this apply to us. We should not allow any opportunity to pass to loyally carry the flag and keep step to the music of the profession.

Dr. JUNKERMAN (closing the discussion). I shall have very little to say in closing the discussion.

In reply to Dr. Morgan's comment on the question of research work in dental colleges, I would say that I did not mean my remarks to apply in the sense in which he referred to them. I referred to the need for research work in colleges after the students have obtained the degree of Doctor of Dental Surgery. As far as the universities are concerned, the more they can do the better, but first these men must be educated to the degree.

With regard to harmony in dentistry, I admit what Dr. Brophy has said. We are harmonious, but Dr. Brophy has lived long enough to know that one specked apple may contaminate the whole barrel eventually. There are a lot of things, as Dr. Brophy says, that we should talk over together; and he is quite right in his intimation that the best way of approaching one's fellow man is to invite him to a good dinner. I would like to take out to a good dinner some of these individuals who have a tendency to misunderstand the purposes and intentions of the colleges, and then I could probably convert them. Dr. Brophy says there is harmony in the profession—but *not educational harmony,* say I. That is what I intended to emphasize in the paper. It is only by educational harmony that we can present a solid phalanx and accomplish the results we wish for the public and for ourselves.

Another matter referred to is the money made in dental colleges. I do not see how that is possible. I do not know of any college that declares a dividend: if there is one in this country that does, I am ignorant of it. I agree with Dr. Brophy in the statement that probably no other set of men make such sacrifices as do teachers, and especially dental teachers. It is necessary for them to do so. We become practically "possessed" with the subject of dental teaching. We get into it like the preacher who receives a "call" to preach: we teach because we love to. I know a great many teachers who do a great deal of work for a few dollars of compensation, but they stick to it. Why? Because they love it. Dental teachers have received the call to teach, and nothing could stop them from teaching and preparing the youth for the profession.

The next order of business for Section II, as announced by the Chairman, was a lantern lecture by Dr. HOWARD R. RAPER, Indianapolis, Ind., entitled "The Value of the Radiograph in the Practice of Modern Dentistry."

Dr. Raper's lecture consisted in a *résumé* of the papers on "Dental Radiography" as published in the *Items of Interest* for 1912. The lecture was discussed by Dr. L. E. Custer, Dayton, Ohio; Dr. R. Ottolengui, New York, N. Y., and Dr. Truman W. Brophy, Chicago, Ill.

The section then adjourned until a later session.

WEDNESDAY—Second Session.

The second session of Section II was called to order at 2.30 o'clock Wednesday afternoon, July 9th, by the chairman, Dr. J. R. Callahan.

The Chairman announced as the first item on the program for the afternoon session a paper by CARL G. PARSONS, M.D., Denver, Colo., entitled "Physiology of Nitrous Oxid and Oxygen Analgesia and Anesthesia," as follows:

Physiology of Nitrous Oxid and Oxygen Analgesia and Anesthesia.

By CARL G. PARSONS, M.D., Denver, Col.

AT the present time there are two main theories as to the nature of narcosis. Meyer and Overton, on the one hand, contend that a loose physico-chemical combination of the fatty constituents of the cells and the anesthetic causes an inhibition of cellular chemism. Verworn, on the other hand, claims that—"The factor which produces the characteristic symptom-complex of narcosis is, under all circumstances, the suppression of the power to carry on oxidation—an acute asphyxia of the cells." The theory of Meyer and Overton would seem to apply to anesthesia produced by alcohol-derived drugs, and that of Verworn possibly, to some extent, to gas anesthesia.

THE SPECIFIC ANESTHETIC ACTION OF NITROUS OXID.

Nitrous oxid possesses a specific anesthetic action, viz, a temporary non-toxic molecular change in the brain-cells, proved by the following reasons, most of which are mine: The early induction of analgesia when nitrous oxid is inhaled in the pure state, before cyanosis appears; the fact that when combined with the proper percentages of oxygen, with the patient showing even an over-pink

color, anesthesia is profound and satisfactory; the fact that characteristic symptoms of anoxemia are not present during a correct gas-oxygen anesthesia; that, if anesthesia were due to cellular asphyxiation, pure nitrogen combined with oxygen would give results equally as good as nitrous oxid and oxygen, but if enough oxygen is combined with the nitrogen to give the patient a pink color, no anesthetic results are obtained (Teter); if an anoxemic nitrous oxid and oxygen narcosis is conducted for any length of time, an asphyxial acidosis, due to suboxidation, will occur in a large number of cases, but with a pink gas-oxygen anesthesia, the above does not obtain. As stated by Teter, when cyanosis does occur with nitrous oxid and oxygen, it is concomitant, and is usually seen during early anesthetization, or when the air-way is obstructed.

Cellular function is almost entirely suspended, but more so by alcohol-derived narcotics because of greater cell destruction, yet afferent—centripetal—impulses are blocked very much more by gas-oxygen anesthesia, thus preventing shock. There is a difference between undiluted nitrous oxid and gas combined with oxygen. The former, when a few breaths are inhaled, soon produces asphyxial symptoms; there is marked venous engorgement; the work of the heart is increased, and headache often follows the administration.

THE ACTION OF OXYGEN.

Nitrous oxid given with varying percentages of pure oxygen produces a scientific narcosis by harmonizing with the law of anesthetic accommodation, and thereby gives a more tranquil and safer anesthesia. In regard to oxygen—"It is not an ordinary pharmaceutic substance endowed with a special therapeutic virtue, but it is a vivifying element by which organic metamorphosis, the *circulus vitalis,* is possible." (Demarquay.) It is said that pure oxygen possesses analgesic properties when inhaled. This is quite true, and further, all respirable gases produce varying degrees of analgesia. Rapid breathing of atmospheric air (Bonwill method) will produce analgesia. By means of the oxygen control, nitrous oxid can be given safely by skilled anesthetists to moribund patients. The inhalation of pure oxygen is pleasant and exhilarating; there is a sense of warmth felt in the entire body, tingling occurs, and perspiration is produced. Acapnia is prevented by gas-oxygen anesthesia. Acapnia means deficient carbon dioxid in the body; it is produced clinically by pain, ether, excitement, sorrow, fear, and rapid artificial respiration, all of which cause excessive respiration—hyperpnœa—with a consequent elimination of carbon dioxid.

THE VALUE OF NITROUS OXID IN ANOCI-ASSOCIATION.

The valuable researches of Crile in regard to the principle of anoci-association places gas-oxygen in its proper sphere in that respect. Anoci-association simply means doing away with harmful or nocuous associations in the patient during a surgical operation. It is accomplished by having the patient in a tranquil frame of mind before the operation; by the preliminary use of narcotic drugs; by peripheral nerve blocking; and by the use of gas-oxygen, and small amounts of ether, if necessary. Crile says—"Anoci-association may further be promoted by the use of pleasant nitrous oxid

instead of the irritating, suffocating ether; provided only that the anesthetist is an expert in this anesthetic."

THE QUESTION OF SHOCK.

Considerable contention has arisen over the subject of so-called primary shock. Shock, in general, means depression, and the surgical pathology is varied. Exhaustion of the vaso-constrictor center, the result of injury, is one condition present in shock. Henderson claims that acapnia is the primary cause of shock. Many persons speak of primary shock when in fact the real condition is reflex inhibition—commonly cardiac. This dangerous phenomenon is usually seen during incomplete chloroformization. Whether or not vagus inhibition occurs during gas-oxygen analgesia or anesthesia is a question. It probably does not, because nitrous oxid and oxygen has a specific property of blocking afferent nerve impulses from the very beginning of the inhalation of the gases. At any rate, personal experience, and the fact that no such condition has been reported, would tend to bear out the above statement.

REFLEXES DURING NITROUS OXID AND OXYGEN ANALGESIA AND ANESTHESIA

The reflexes during gas-oxygen analgesia and anesthesia are more active in the various stages of narcosis than when ether or chloroform is the anesthetic used. Nitrous oxid is not a toxic nor depressing drug, like the latter, consequently there is more muscular tonicity and more active reflexes. The special reflexes made use of during gas anesthesia are the conjunctival (lid reflex), tarso-corneal reflex (Parsons' reflex, produced by pressing the margin of the superior tarsal plate against the cornea, directly over the pupil, producing reflexly an inward retraction of the lower lid), and the pupillary reflexes, including reaction to light and marginal motility, and the crossed concomitant. The degree of anesthesia depends upon the comparative activity of the reflex, viz, the less active the reaction, the deeper the narcosis.

Much more could and will be written about the physiology of this important gas, but this article is only intended to bring out a few points of practical importance.

Discussion.

Dr. J. S. Jackson, Denver, Colo. Dr. Parsons gives a very minute, concise, and scientific treatise on the physiologic action of nitrous oxid and the combination of nitrous oxid and oxygen in analgesia and anesthesia. He records an observation which all anesthetists have noted, viz—"A few breaths of nitrous oxid inhaled soon produce asphyxial symptoms. There is marked venous engorgement; the work of the heart is increased, and headache often follows its administration." This quotation and the entire paper impress me most strongly with the danger involved in the administration of anesthetics, even nitrous oxid, which is claimed by its admirers to be the safest of all anesthetics, though this has not been proved. In their efforts to prove the safety of gas-oxygen anesthesia, they decry the safety of nitrous oxid, with or without air. Perhaps one of the most dangerous symptoms of nitrous-oxid narcosis is blood pressure in all cases; especially is this true in patients advanced in years. If we suppose the

blood pressure to be from 20 to 30 mm. of mercury above normal, and if by the administration of nitrous oxid this pressure is raised another 20 or 30 points, rupture of a sclerotic artery might be caused, giving rise to a very serious condition. We are all aware that oxygen is not a panacea for the deleterious effects of nitrous oxid. It may lead in combination with nitrous oxid to more serious and mysterious symptoms than nitrous oxid alone. It seems to be taken for granted that oxygen can be introduced by the lungs as readily as food is carried into the system through the stomach, and that by its administration all the organic operations of the economy can be roused to increased activity, but it has been proved that not more than a certain proportion of oxygen, such as exists in the atmosphere, can be absorbed by the lungs. It should also be remembered that oxygen, when inhaled in large quantities, is so far from being a stimulant that it relaxes and debilitates the system, in fact induces narcotism. Happily the gas-oxygen combination, or any other anesthetic, will not be administered as recklessly as has been done in the past. The administration of ether and chloroform mixed is difficult, because of the difference in the density of the two gases. Perhaps somnoform has given us the idea of a definite anesthetic mixture. With the reasonable safety of nitrous oxid alone, and mixed with a known quantity of oxygen, and a skilled anesthetist who can follow symptoms by intuition, beyond the shadow of a doubt as to when to increase and when to decrease the quantities and proportions, the responsibility of success or failure is left where, perhaps, it properly belongs, viz, to the "man behind the gun," the anesthetist. Very little is known of respiration, and that little seems to be far from right. If a patient is short of breath, or anything is wrong with him that looks like failure of respiration, as much chemically pure oxygen is administered as the pulse will tolerate—when the one substance that might, for a time at least, restore the respiratory centers to normal activity is carbon dioxid!

I think the principle of gas-oxygen anesthesia is faulty, if not wrong. In its administration we diminish the amount of carbon dioxid, nature's respiratory stimulant, and have no means except rebreathing to replace it. Let us get right, therefore; we lack knowledge of the functions of man himself, and not until we understand the respiratory and circulatory system more fully can we hope for an anesthetic that will deaden the sensibilities and yet keep and leave the patient in a normal condition.

Dr. O. Cunningham, Kansas City. We may add two reasons why nitrous oxid is an anesthetic agent independent of oxygen; one is, Anesthesia can be obtained in children by administering from forty to fifty per cent. oxygen with nitrous oxid; another is, If nitrous oxid is breathed for ten or fifteen seconds, the effects are easily felt. One may hold his breath for a minute or longer without getting any analgesic effect. This, together with what Dr. Parsons has said, is fairly conclusive to me that nitrous oxid is a true anesthetic agent.

I believe the administration of nitrous oxid anesthesia has been sadly neglected as regards the proper selection of cases. It is true that many of the cases that take nitrous oxid and oxygen apparently the best, involve the greatest risk. We can divide the cases that present

complications into four divisions: First, complications due to obstructions such as adenoids, etc.; then three more divisions in which complications principally arise in connection with respiratory exchange, viz, the exchange of oxygen between the lungs and the blood. As a person develops from adolescence, the lungs keep pace with the body. Early in childhood the body weight is greater in proportion to the lung capacity. This is gradually overcome, but often, after adolescence, an individual takes on additional weight, which interferes with the administration of nitrous oxid through the limitation of oxygen.

Suppose an individual weighs one hundred and fifty pounds at adolescence, then within a few years takes on thirty additional pounds; a true respiratory exchange would add two per cent. oxygen, instead of which four or five per cent. of oxygen should be added. This is probably because there is also a delinquency in the cardiac functions and in other organs of the body, as well as in the lungs.

Another limitation of gas-oxygen anesthesia is in the case of anemia. A person whose hemoglobin amounts to only 50 per cent., will require fully 50 per cent. of oxygen. This proves that the deficiency in hemoglobin limits the oxygen-carrying capacity fully one-half; but if the hemoglobin is 50 per cent., we do not add oxygen in the same proportion. Another limitation is toxemia, which also has to do with the respiratory exchange. If the patient has from thirty-five to forty respirations per minute, he would be getting about double the supply; this would indicate that the toxemia has nothing to do with the hemoglobin limiting the oxygen-carrying capacity. With the hemoglobin about one-half, we would have to use fully 50 per cent. of oxygen.

I believe that the time is coming when a careful selection of cases will be considered in analgesia as well as in prolonged anesthesia with nitrous oxid and oxygen.

In the use of nitrous oxid in dental work, we sometimes desire to secure prolonged anesthesia in some operations, but since analgesia has come into use, one dentist will usually employ nitrous oxid to the stage of complete anesthesia, even if he has only one or two teeth to extract, while another will employ analgesia. When we induce anesthesia for the shortest available period, we really need no oxygen, although oxygen is very good to have at hand, and affords a little longer working period. In analgesia, the amount of air admitted to the mouth supplies all the oxygen needed, as the normal individual requires only about ten per cent. The nitrous oxid administered for this purpose need not be under positive pressure; although, if prolonged anesthesia is desired, an inhaler is needed, and positive pressure. The positive pressure inhaler is to be avoided merely because of the inconvenience of the soft palate pressing against the tongue and in case the tongue drops back, creating an excessive intrapalatal compression.

Dr. Wm. C. Teter, Cleveland, Ohio. Although I am not on the program to discuss this paper, having met Dr. Parsons recently in Cleveland and having expressed my desire to hear his paper on the subject of nitrous oxid and oxygen, I am very glad to take part in the discussion, as the administration and study of this anesthetic is the greatest part of my life-work.

The physiological properties of ni-

trous oxid and oxygen, I believe, are less definitely known and understood than those of any other anesthetic agent. A number of theories have been advanced. Dr. Crile has written considerably upon the subject, yet I cannot concur in his belief regarding the anesthetic properties of this agent. My knowledge of the subject has not been gained by research work along this line, but is based wholly upon ten years of clinical experience and actual work in major and minor surgery, and in the extraction of teeth. Although in my practice I have not used analgesia for a number of years, I sometimes administer it for other dentists.

Cyanosis is no part of anesthesia. Nitrous oxid is not always responsible for the cyanosis that appears in the initiatory stage of anesthesia. There may be obstructions such as have been spoken of here; the patient may struggle or other complications may arise that produce cyanosis, and oxygen alone is not always indicated for overcoming that condition.

I think cyanosis or the livid color or bluish cast of the complexion will occur almost always in the beginning of the inhalation of nitrous oxid and oxygen in the average person in very good health and with plenty of red blood, but not necessarily in a weak and anemic patient. Cyanosis is due to the crowding of nitrous oxid in the desire to obtain the proper anesthetic tension. It can be overcome if a longer time is consumed in producing anesthetic tension. In ether and chloroform anesthesia a considerable period of time is consumed in obtaining this tension, and more time should be taken when nitrous oxid and oxygen is the anesthetic agent employed.

The asphyxial element at commencing is a hindrance to anesthesia. The more asphyxia, the farther away the patient is getting from real anesthesia. The asphyxial character of nitrous oxid, therefore, is entirely separated from its anesthetic property, and a proper amount of nitrous oxid with oxygen will not cause asphyxia.

In the administration of nitrous oxid and oxygen, we find that the administration of warm gas under positive pressure and its gradual mixture with oxygen are the greatest factors in preventing both cyanosis and asphyxia.

Much has been said about shock resulting from the administration of this anesthetic. In my opinion the administration of nitrous oxid and oxygen produces no shock to the system. It is non-irritating to the respiratory tract and to the lungs, and I do not believe that it has a chemical action upon the cellular tissue. It is a mechanical compound or mixture with molecular action upon the blood corpuscles acting upon the brain centers that produces sleep, not unconsciousness—because unconsciousness is not always anesthesia. When ether or chloroform is used as an anesthetic, I believe that as much shock results from the anesthetic as from the traumatism of the operation. Another factor that tends to inhibit shock in the administration of nitrous oxid and oxygen is the fact that phagocytosis is not affected; the patient retains all the resistance necessary to combat the shock from the operation. In a person of low vitality, if ether is given, the resisting power is considerably reduced, therefore shock is produced by the anesthetic. If, in addition, there is shock from the operation, the patient has less chance of regaining consciousness. I believe,

therefore, that in regard to shock, very much is to be said in favor of nitrous oxid.

Dr. Crile of Cleveland has recently written about the use of novocain, which he has been employing in his practice, as an agent which acts upon the periphery of the nerves. This suggestion, I believe, is one of the best that has been made to the surgical profession for a long time. I also believe that by administering nitrous oxid and oxygen, together with the use of this local agent, a careful surgeon can do away with the major part of shock.

The use of carbon dioxid is based largely on theory at the present time. I was in New York City a short time ago and heard Professor Henderson of Yale speak upon this subject. He admitted that there is a great deal of mere theory in connection with it. He has an apparatus consisting of a little motor, which he employs to administer carbon dioxid. He mentioned the case of a boy who had both limbs cut off in a streetcar accident and to whom he administered the carbon dioxid and kept him alive for some time, though he finally succumbed to the shock and loss of blood. Still, the result in this case was quite problematical as to how much the gas contributed to prolonging the boy's life. He stated also that it would not do to administer too large a dose of that gas.

In my anesthetic work, I obtain carbon dioxid in the mixture by the rebreathing method. In a number of experiments conducted at St. Luke's Hospital, and reported by Dr. Chas. K. Teter, the patients were made to breathe back and forth into the bag, and the contents of these bags were saved and analyzed. It was proved that they contained from four to eight and one-half per cent. of carbon dioxid, depending, I think, largely upon the amount of nitrous oxid required to maintain anesthetic tension.

Dr. Jackson spoke of the safety of nitrous oxid and oxygen. In the earlier days of the revival of the use of nitrous oxid in the dental profession, the safety of the administration of this agent was chiefly spoken of. It is a proved fact that it is the safest anesthetic if properly administered. I do not believe, however, that it is the safest anesthetic in major surgery in the hands of the novice. If I were compelled to take an anesthetic and I had the choice between taking nitrous oxid and oxygen administered by an inexperienced man or ether administered by an experienced man, I would prefer the ether. But that does not disprove the fact that nitrous oxid and oxygen is the safest anesthetic which can be employed, if properly administered.

In case of a cessation of breathing, as has been said, oxygen is not always called for. This is a fact, because oxygen cannot be given if nitrous oxid and oxygen anesthesia is being induced, as in all probability the patient, if he has good color, has already too much oxygen, and therefore will hesitate in breathing until he needs more oxygen. In the analgesic stage, the patient can hold his breath a long time; he is not actually holding his breath by any conscious effort, but his system does not demand any more oxygen, and therefore does not take in any more.

Children, as Dr. Cunningham has said, will take a larger percentage of oxygen, in a majority of cases, after anesthesia is induced, though in my tonsil and adenoid work I find that some chil-

dren as young as two years of age really require more nitrous oxid with more pressure to secure quiet anesthesia than is required by adults. I have frequently resorted to the addition of a small quantity of ether in those cases, simply because in the child the respiration is so fickle that, by the time he has been quieted with nitrous oxid and oxygen, the operator has to be very careful, lest respiration cease or the child be thrown into clonic spasms.

I realize that the essayist's paper and the discussion largely pertains to the administration of nitrous oxid and oxygen in major surgery. I also realize that this is a meeting of dentists, and that there is a wide difference between the administration of this gas in major surgery and its administration in the practice of dentistry. For the benefit of our medical brethren, I want to disabuse their minds of the opinion that it is easier for the dentist to give nitrous oxid and oxygen in his practice than it is in major surgery, because the opposite is true. Prolonged anesthesia for oral operations is seventy-five per cent. more difficult to get and to maintain satisfactorily than when the face inhaler can be used and all air excluded, as for major surgery. In dental operations we have to contend with the air that is breathed through the mouth when the latter is open and the muscles are relaxed. The atmospheric pressure of fifteen pounds to the square inch compels the patient to breathe through the mouth, therefore no effect is obtained from the anesthetic unless the gas is forced, and forcing the gas involves other difficulties.

I do not agree with Dr. Cunningham regarding asphyxia induced by the gas. In the old method of giving nitrous oxid with the common gasometer and face inhaler, the air-valve was opened after the first few inhalations in order to overcome the depressing asphyxial effect. This was not done to produce anesthesia, but for the comfort of the patient. It takes as long or longer to produce nitrous oxid anesthesia in a manner comfortable to the patient, than it does to produce nitrous oxid and oxygen anesthesia with the nasal inhaler. If the patient is watched carefully, and he is not fighting the anesthetic, and oxygen is added gradually, all sense of suffocation or distress on the patient's part can be overcome. It is better, therefore, to administer nitrous oxid and oxygen regardless of the fact that anesthesia can be obtained with nitrous oxid alone. After the operation is begun, and the patient commences to breathe through the mouth, it is necessary to force the gas to the point where it will be taken into the lungs.

In extracting this is easier than in throat work, because in extracting cases sterile sponges can be used to pack the mouth, preventing a certain amount of the air being breathed in that way, and if the mouth be packed solidly enough, the patient can be compelled to breathe or will breathe through the nose. Therefore the gas will not have to be forced.

I never advise the use of the face inhaler to induce anesthesia for extracting teeth. Even if we have only one tooth to extract, we do not know in advance how much suffering the extraction of that one tooth might cause. Some of the most difficult and painful extractions are caused by teeth which may appear as if they would come out easily. I never want to assume the risk of inducing anesthesia thinking that I can remove a tooth in thirty seconds with-

out the patient feeling it, for I may not be able to do it. In all my extracting, therefore, I use the nasal inhaler, so that I may be prepared for any emergencies.

As to analgesia, I believe that fully nine-tenths of our operators are working in the first stage of light anesthesia. It requires very little gas to produce analgesia in the majority of cases. While many operators advocate the use of nitrous oxid and oxygen for analgesia, I would advise the use of a great deal of air, because the capacity of the lungs demands so much volume. With every inhalation and exhalation a certain amount of gas or air is taken into and expelled from the lungs. No great volume of nitrous oxid and oxygen is required to produce analgesia.

I would not depend upon nitrous oxid and air alone, for oxygen has some analgesic properties in addition to being preferable for many other reasons, and I believe it is safer to use nitrous oxid and oxygen at all times instead of nitrous oxid alone.

Dr. R. D. Hammond, Winfield, Kans. I would like to inquire as to the advisability of the administration of oxygen after the patient has gotten over the effects of the anesthetic?

A Member. It occasionally happens that the heart stops beating for a moment, but the pulsations will resume after four or five inhalations of nitrous oxid. I would like to have the essayist explain that phenomenon.

Dr. Morgan. Many times there is a form of hysteria that follows anesthesia; I want the speaker to touch upon that phase.

Dr. W. L. Reed, Mexico, Mo. I would like to inquire what is the test by which the essayist may know that he has complete anesthesia. Is it the eye test, or the facial appearance, or the breathing?

Dr. O'Bryon, Lawrence, Kans. I have heard it stated that nitrous oxid and oxygen for analgesia is not dangerous at all. I would like to know if that is true?

Dr. Lee, Greenfield, Mo. Which is the better, to start with pure nitrous oxid, or oxygen, or to start with a little oxygen combined with nitrous oxid?

Dr. H. S. Daniels, Mexico, Mo. Is it necessary to have an assistant administrator?

Dr. Parsons (closing the discussion). I had hoped that more questions would be asked about the theory that anesthesia with gas-oxygen is due to anoxemia. I have in my paper given the reasons why nitrous oxid has true and specific anesthetic properties, and have stated that the limitation of oxygen has nothing to do with producing a satisfactory anesthesia. I mentioned the above for a specific purpose, namely, to emphasize the true nature of this valuable drug, so that you may be able to produce better analgesias and anesthesias. Some patients color up quickly under nitrous oxid and oxygen; they seem to be susceptible to nitrous oxid. To overcome this condition and produce a pink color, a greater amount of oxygen is needed. This causes in turn an apnœa, a transient cessation of respiration from an overabundance of oxygen. This fact should be kept in mind, and should occasion no alarm to the administrator.

In regard to the safety of nitrous oxid and oxygen, I will say that in competent hands it is the safest general anesthetic we have, but on account of the small margin between no anesthesia and profound anesthesia, it is a very difficult anesthetic to administer, and, with a

tyro, deaths are very likely to occur—indeed, not a few have occurred within the past few years. When analgesia or anesthesia clinics are held, it behooves the spectators to have a profound respect for the gases being used, and not to joke and jolly with the patient during the induction of anesthesia.

The question is often asked why nitrous oxid, the properties of which were discovered in 1842, has only recently attained its present universal use in surgery. Three reasons may be given in answer to this: First, a better understanding of the physiological action of gas and oxygen; second, perfection of apparatus, and third, specialization of practitioners in anesthetics and their administration.

My paper was short, it being intended only to bring out a few important physiological points. I did not touch on the subject of rebreathing, but I might say that rebreathing, to a certain extent, and at proper times during anesthesia—when apnœa or acapnia occurs, for instance—is allowable and of advantage, if the administrator possesses a profound knowledge of the physiology of respiration.

The heart may stop momentarily after a few inhalations of pure nitrous oxid, probably due to vagus stimulation, or perhaps to a sudden dilatation of the right heart. However, I have never observed this condition, because I always induce anesthesia slowly.

Hysteria may follow the administration of nitrous oxid and oxygen as well as after other anesthetics in neurotic individuals.

Many times I have been asked about primary shock occurring during the performing of operations in the analgesic stage under nitrous oxid and oxygen. I believe there is no danger; at least, no cases of untoward symptoms have been reported, and personally I have never observed any. Many operators speak of primary shock when, in reality, they mean reflex cardiac or respiratory inhibition. The two conditions are entirely different and a differential diagnosis should be made. Since nitrous oxid and oxygen produces central nerve blocking from the very beginning of administration, it is difficult to see how either of these two conditions could occur.

Nitrous oxid and oxygen analgesia and anesthesia should be induced from the beginning with a combination of both gases, which insures a better and more scientific narcosis.

Someone asks regarding the administration of oxygen following anesthetization. Following all anesthetics it is a distinct advantage to give a small amount of oxygen. This gas overcomes any cellular anoxemia that might be present, and also oxidizes acidosis bodies, if they be present.

In regard to an assistant, it is of advantage to have one, for a number of obvious reasons.

In conclusion, let me impress upon you the importance of the law of anesthetic accommodation, viz, that—"Living units of the animal body will more readily adjust themselves to altered conditions of existence when the conditions are applied gradually." Therefore, with all anesthetics, the narcosis should be induced gradually and uniformly.

The next order of business for Section II was the reading of a paper by Dr. Arthur D. Black, Chicago, Ill., entitled "Something of the Etiology and Early Pathology of the Diseases of the Peridental Membrane, with Suggestions as to Treatment," as follows:

Something of the Etiology and Early Pathology of the Diseases of the Peridental Membrane, with Suggestions as to Treatment.

By ARTHUR D. BLACK, A.M., M.D., D.D.S., Chicago, Ill.

THE consideration of diseases of the soft tissues adjacent to the teeth has always occupied a prominent place in the literature of dentistry, and yet a review of many articles cannot fail to impress the fact that there has been little effort to mention in detail and proper sequence the pathological changes which take place in these tissues, nor to separate definitely several of the most common lesions which we are constantly called upon to treat. As a natural result the profession has apparently failed to recognize and differentiate these lesions and has also failed to apply treatment during the early stages, while there is the opportunity to cure them. This seems to be partly due to the fact that the elapsed time between the initial lesion and the serious injury which requires the loss of the tooth for its cure is so great—often so long in a single case as the total number of years devoted to practice by many of our profession. I have records of several cases, the earlier years of these records having been made by men in practice before my time, in which more than thirty years have passed from the time of the original inflammation to the final loss of the teeth. It is, therefore, very difficult to secure complete data for individual cases, but we may learn much from the observation of many cases in different stages of progress.

If the statements which will be hereafter made are true, the attitude of the profession toward this group of diseases must be greatly changed. Instead of years of treatment, generally ending in lost battles, there must be more decisive early action, in which lies our hope of success. It is the intention that this paper shall present in detail information which the writer has been able to gather regarding the etiology and early pathology of three distinct conditions, and to follow each to its termination. This is done with the realization that these tissues are involved from other causes, but with the belief that those to be mentioned cover a very large majority of all cases. This presentation will be principally clinical, and the various suggestions made as to treatment will be those which seem to be rationally indicated by the conditions.

It should be stated that the writer has had access during the past winter to the manuscript of Dr. G. V. Black for a book on the pathology of the soft tissues adjacent to the teeth, and has not hesitated to draw very freely on that manuscript for material relative to deposits of calculus, credit for which is hereby given. It might also be said that the work of investigation in this field which has been done by your essayist during the past few years has been developed under the direction of the above-mentioned gentleman, and it is a pleasure to make acknowledgment thereof also at this time.

If we seek the initial lesions which lead to inflammations of the peridental membrane, we shall find practically all of them in one or the other of two tissues, the pulp of the tooth or the free margin of the gum—the gingivæ. The initial lesion is, then, a pulpitis or a gingivitis; in the one instance the first involvement of the peridental membrane is at the apex of the root, in the other, at the gingival line of the tooth. Except from occasional accidental causes, such as an inflammation resulting from a hole drilled through the side of a root, peridental inflammations do not start anywhere but at the end of the root or the gingival line. In this paper, consideration is confined to the group beginning at the gingival line.

If we recognize the fact that for every such case of inflammation of the peridental membrane there must be a preceding inflammation of the gingivæ, we should look first at the gingivitis, together with the various conditions which cause it, and follow the progress of the inflammation as it gradually involves and destroys the peridental membrane. We should at the same time have constantly in our minds the question of the treatment indicated in the various stages, which might check the further progress of tissue destruction.

SALIVARY CALCULUS.

Recent investigations seem to disprove the theories which have been held by the profession for many years relative to the manner in which salivary calculus is deposited. I quote the following from Dr. G. V. Black: "I am slowly, by each successive step, being driven to the conclusion that the thought of a precipitate of calcium salts from the saliva, so long held—by myself and all the rest—has been a myth. It seems now that calculus comes into the mouth as a finely divided and semi-fluid calcoglobulin, which, with the decomposition of much of the colloid elements, hardens into stony calculus." Particular attention is called to the fact that this calcoglobulin is very soft when it is first deposited, and from twenty-four to forty-eight hours are required for it to become hard. Another very important fact is that the outpouring of the calcoglobulin is decidedly paroxysmal, and each occurrence is of short duration, following within a few hours after a hearty meal. These paroxysms are due to a lack of balance between the amount of food taken into the system and the regular eliminative process. The kind of food ingested seems to make little difference; if the quantity is more than can be properly disposed of through the natural nutritional and eliminative processes, the excess is thrown into the system and is eliminated through the salivary and other glands and fluid excretory routes. These paroxysms are so definitely related to excesses of eating that one may determine in advance with considerable accuracy the time of beginning and the duration of the outpouring of the deposit; in fact, one may control the deposit by the diet. For the benefit of those who may not have read the already published papers on this subject, it may be stated that the study of the deposit is made very simple by the use of specially ground microscopical cover-glasses held in a gold frame in the mouth in the region of the buccal surfaces of the upper molars. These cover-glasses may be removed and the deposit prepared for microscopical study without disturbing it.

Deposits of this material occur first on the surfaces of those teeth closest to the openings of the ducts of the parotid and sublingual glands, and in the most sheltered positions on those surfaces which are least affected by the natural scouring processes, viz, near the margin of the free gingivæ on the lingual surfaces of the lower incisors and the buccal surfaces of the upper molars. It may gradually spread to other teeth and other surfaces. Except in cases of long standing, the deposits are usually confined to buccal or lingual surfaces, and do not involve proximal surfaces. This deposit is at first white or very nearly transparent, and quite soft, and while soft it seems to cause no inflammation of the gingivæ. Attention is called to the fact that this deposit occurs on the exposed surface of the tooth, and not under the free margin of the gum. It does, however, encroach upon the free margin sufficiently to cause a slight inflammation of this tissue, as a result of which the gingiva becomes thicker and recedes a little, both of which changes give opportunity for additional lodgment, by presenting a broader shelf adjacent to the tooth. Additional lodgment causes additional inflammation and recession, and so the process continues, gradually destroying, first the gingivæ, then the gum tissue and peridental membrane, together with the alveolar process to which the latter is attached, exposing more and more of the root, until so much of the tooth socket is destroyed that the tooth becomes so loose that it may be removed with the fingers. The inflamed tissue bleeds on the slightest irritation, although there is seldom complaint of either pain or tenderness until the tooth has become quite loose. There is commonly an accompanying pyogenic infection of the soft tissues, but rarely a destruction of the peridental membrane in advance of the destruction of the overlying tissues. Our picture, then, of the typical case of salivary calculus is one in which there is a gradual accumulation of the deposit with a corresponding disappearance of the tissues overlying the crown and root surface, usually without the formation of pockets about the roots of the teeth, but generally accompanied by suppuration.

SERUMAL CALCULUS.

Serumal calculus is different from salivary calculus in the form, color, position, and source of the deposit. The nature of the deposit itself is, however, practically the same. It is thrown out with the serum into the subgingival space, and is deposited on the enamel under the free margin of the gum, or on the root if the peridental membrane has been destroyed. When the deposit is on the enamel, in the subgingival space, it is usually in the form of a dark brown flattened scale, or several of them, attached to the enamel. It is probably flattened while soft by the pressure of the overlying gum tissue. When it is on the cementum, it is more likely to be nodular in form and to present a much rougher surface to the overlying soft tissue. This form has been specially designated as pus-pocket calculus. In many cases these deposits are found on the enamel in the subgingival space, when no previous inflammation of the overlying soft tissue had been noted, and the question might be raised as to whether it is necessary to have a preceding inflammation, or whether the deposit might occur as a result of overfeeding, the excess of calcoglobulin in the fluids of the

body being poured out into the subgingival spaces. This would seem likely in cases in which there are deposits occurring on many teeth at the same time. We certainly often see the deposit as a sequence to inflammations of the gingivæ. When the overlying gum tissue is thin, it is usually darker red than normally, or slightly bluish, over these deposits, and the diagnosis of the presence of the deposit can frequently be made on the appearance of the gum tissue. The presence of such deposits may be determined with a subgingival explorer or a scaler suitable in form to be drawn over the surface of the enamel without injury to the overlying tissue. After there is such a deposit, it serves to cause inflammation of the overlying tissue, even though the original cause of the inflammation may have been removed. This in turn causes the outpouring of more serum with additional deposits of calculus. The inflamed tissue becomes infected with pyogenic organisms and there is a gradual involvement and destruction of the peridental membrane. As the attachment of this membrane is destroyed, the gingivæ become shorter. Those fibers of the peridental membrane which are cut off from their attachment to the cementum disappear by absorption, as does the portion of the bone of the alveolar process to which they were attached. There is much variation in the appearance of the soft tissue overlying the deposits on the cementum; in some cases this tissue will appear to be quite normal, although the pockets may reach almost to the root-ends, while in other cases the overlying tissue will be considerably swollen and congested. There will usually be intermittent periods of tenderness and pain, patients being quite free from discomfort at other times.

The most important difference between this process of destruction and that resulting from salivary calculus is, that the deposits of serumal calculus are always under the soft tissue which surrounds the tooth, and the tendency is to form pockets which become gradually deeper, cutting the peridental membrane away from the cementum. With salivary calculus there is the gradual complete destruction of all tissue overlying the portion of the crown and root involved, and generally without the formation of a pocket. With serumal calculus the free gingivæ and gum tissue remain, while the attachment to the cementum is cut loose, and the fibers of the peridental membrane, also the bone to which they are attached, disappear.

TRAUMATIC INJURIES.

Very few of the articles in our literature mention traumatic injuries as a cause of disease of the peridental membrane, yet statistics which your essayist has gathered tend to show that about from one-half to two-thirds of all inflammations of the gingivæ are traumatic. On account of the resistance offered by the gingivæ to the severe punishment to which this tissue is subjected, the irritation is usually kept up practically continuously for years before the tissues are seriously involved, and we have therefore failed to associate the apparently trivial cause with the eventual serious result. It is to this group of injuries that I wish to call particular attention.

The injuries may be divided into two principal classes—those which are caused by foodstuffs which become wedged between the teeth on account of lack of contact or improper contact, and those

caused by deviations from the normal smooth contour of the teeth, such as sharp cavity margins, imperfect filling margins, ill-fitting crowns, etc. The interproximal gum septum—the septal tissue—is involved much oftener than the buccal and lingual gingivæ, by reason of the fact that all food lodgments between the teeth involve this tissue, and because caries and filling operations are more numerous in proximal surfaces. In those cases in which there is impaction of food in the interproximal space, there is first a slight inflammation of the septal tissue, followed by a noticeable swelling of the buccal and lingual portions, as the central portion is depressed by the impacted food. Gradually the tissue is destroyed by the pressure and irritation of the food débris, and the process continues, involving peridental membrane and alveolar process. All of the inflammations of this group are very likely to be accompanied, after a time, by deposits of serumal calculus on the enamel or cementum underlying the inflamed area, and this in turn acts as an additional irritant. Cases of this group may progress independently of the trauma, owing to the inflammation caused by the deposits.

The epithelium covering the septal tissue is very dense, and resists to the utmost the irritations to which it is subjected; if not seriously injured, it will usually return to its normal condition in a short time after the irritation is removed. The progress of the destructive process is much varied in individual cases. In those in which the impacted food is removed quickly after each impaction, many years may pass without serious injury. Even in those cases in which the impacted food is not removed, it is surprising how much time may elapse—often years—before the peridental membrane is involved. The difference in the sensitiveness of the gingivæ in different individuals is most remarkable, some complaining severely of the pain caused by the slightest impaction, others insisting that they have felt no discomfort whatever, although they present many interproximal spaces jammed with food débris.

STATISTICS.

For several years your essayist has been collecting records of examinations of mouths which were receiving at least average care both by the patients themselves and their dentists, to determine, if possible, something as to existing conditions. It is apparent that we are not as a profession paying much attention to gingivitis, but delay instituting treatment until after the development of a definite pericementitis. Since a gingivitis must precede each case of pericementitis, and in view of the fact that our treatment of the peridental inflammations has generally been unsatisfactory, it occurred to your essayist that we should pay more attention to the areas of gingivitis.

The effort was therefore made to determine the condition of the average mouth as to gingivitis. A definite plan for mouth examinations was worked out, by which a record might be made of each area of gingivitis, with its apparent cause. The charts used have a space in which to mark the condition for each of the four sides of each root, and a separate space for each interproximal gum septum. The use of a system of numbers makes the recording of such examinations very simple.

In connection with a paper read before the Chicago Dental Society in April

1912,* there were published statistics of 376 examinations made by selected dentists in various sections of the country. Since then more have been added, bringing the total up to more than five hundred. Very careful instructions were sent to each dentist who made examinations, in order that they might be made as nearly uniform as possible. While it is recognized that the examination of the mouths of five hundred persons is insufficient as a basis for absolutely positive conclusions, yet the reports are so uniform in that they record areas of gingivitis in the mouths of most persons, that we cannot fail to recognize the fact that there are presented to each of us in practice, practically every day, several areas which should have more careful consideration and attention than they are receiving.

While considerably more than five hundred mouths have been examined, there will be presented at this time the summary for a tabulation covering exactly 500 cases, selected by eliminating the cards for all persons younger than twenty or older than thirty-five years, also by eliminating cards for all persons having lesions of the peridental membrane. This summary is, then, a record of the areas of gingivitis found in the mouths of 500 young adults, between twenty and thirty-five years of age, the average age being 26.3, none of whom have disease of the peridental membrane.

Of the 500 mouths, 25 were reported as having no gingivitis, viz, just 5 per cent. Of these 25, but 17 had all contacts in good form. Each of the other 8 had one or more open contacts, but no inflammation of the gingivæ at the time of the examination. In the mouths of the remaining 475 persons, there were reported 4265 areas of gingivitis, viz, an average of 8.53 per person for the 500 examined. Is not this statement alone very significant of the fact that the relationship of the gingivitis to disease of the peridental membrane is not sufficiently appreciated?

The 4265 areas of gingivitis may be classified as follows:

There were 1348 areas due to deposits of salivary calculus; these were in the mouths of 198 persons, making an average of 7.8 per person. It should be stated that reports recorded deposits on more than one surface of the same tooth in 123 instances, and the very large majority of these were lower incisors marked as having exhibited deposits both lingually and labially. The percentage of the 500 patients examined, who had deposits of salivary calculus, is 39.6. The percentage of all of the areas of gingivitis reported as due to salivary calculus is 31.6.

There were 563 areas reported as showing serumal deposits, and in which no other cause of the gingivitis was recorded. These were in the mouths of 75 persons, an average of 7.5 areas per person. The percentage of the 500 examined who had deposits of serumal calculus is 15. The percentage of all of the areas of gingivitis reported as having serumal deposits is 13.1.

There were 33 mouths in which deposits of both salivary and serumal calculus were recorded, making a total of 140 persons having either kind or both. This leaves 360 of those examined for whom no deposits were reported.

There were 2354 areas of gingivitis due to other causes than deposits, subdivided as follows: 783 were due to bad margins of fillings or crowns, 496 to lack

* *Dental Review*, vol. xxvi, 1912, p. 861.

of contact of proximal fillings or crowns, 305 to improper contact of proximal fillings or crowns, 263 to malpositions or atypical forms of proximal surfaces, 255 to lack of contact of teeth having no caries of proximal surfaces, 233 to caries of proximal surfaces, and 19 to worn contacts. If the areas due to malpositions, etc., to lack of contact of undecayed teeth, to caries, and to worn contacts, are not counted, there remain 1584 areas, the large majority of which are due to imperfect dental operations. These are more than 37 per cent. of all areas of gingivitis reported. The percentage of all the areas of gingivitis reported as due to trauma is 55.1. For all persons included in the tabulations there is an average of 4.7 areas of gingivitis per person due to trauma.

TREATMENT.

In the treatment of all diseases, we are today looking more and more for preventive measures. The more we know of etiology and early pathology, the better are we prepared to use preventive treatment. In the group of conditions under consideration a division can be made, on the one side of which treatment may be said to be truly preventive, on the other side of which it must generally be considered as palliative. The division rests on the determination as to whether or not there has been a detachment of considerable depth of the peridental membrane from the cementum. Previous to such detachment the prognosis is good for a quick recovery, if proper treatment is instituted; after such detachment there is generally no possibility of restoring to their normal condition the tissues involved, because the detached fibers have disappeared by absorption, as has the alveolar process to which they were attached. It seems rational, therefore, that we should make the utmost effort to apply effective treatment to cure the gingivitis, and thus prevent the more serious lesions of the peridental membrane.

The very simple facts mentioned relative to the character of deposits of salivary calculus indicate clearly that the prevention of gingivitis from this cause is a duty which should be performed by the patient under the guidance of the dentist. The patient may entirely prevent deposits by limiting his diet to his needs, or failing to do this, he may easily remove the deposit with the tooth-brush and plain water, by careful brushing twice daily. It should be made clear that the deposit is so soft at first that it may be very easily brushed off, but that it may become so hard within twenty-four hours that no amount of brushing will remove it. It is not sufficient that the dentist remove these deposits once in six months, and the patient neglect to use the brush properly and with sufficient frequency and regularity in the meantime, for, under such care, there will be some progress in the destruction of the soft tissue each year. A very simple statement to patients concerning conditions under which deposits occur, and the time required for them to become hard, should impress the necessity for conscientious care which many will gladly give. The dentist's duty should be principally that of an instructor in the management of these cases, supplemented by frequent examinations and the removal of deposits in positions which have escaped the brush of the patient. At each visit, the patient's attention should be called to areas which have not been properly brushed, and directions given for the care of such areas.

Cases of gingivitis accompanied by deposits of serumal calculus should be discovered early, and the deposits carefully removed. In each instance a search should be made to find an exciting cause of the inflammation other than the deposit, and this should be eliminated if possible. In those cases in which there is a tendency to the frequent recurrence of these deposits, the patient should be taught to flush out the subgingival spaces twice daily with physiological salt solution, using a large rubber bulb syringe. The end of the syringe nozzle should be so large that it may not be inserted between the free gingivæ and the tooth; it should be held in contact with the enamel, close to the margin of the gingivæ and carried along the margin, at such an angle that the solution will be forced into the subgingival space. This cleanses the spaces thoroughly without irritation and has proved very effective. Records should be kept of the positions in which these deposits are found, and careful examinations should be made at stated intervals to find and remove additional deposits.

Most of those cases of gingivitis which are clearly traumatic may either be prevented by greater care in our routine operations, or they may be cured by performing whatever operation is necessary to do away with the irritation. We all know well enough how to do these things, but their importance is not realized and they are not done. One case in the writer's practice will be cited: A new patient, a man of about forty-eight years, presented a few months ago for examination. No cavities were found, but the septal tissue between the lower right cuspid and first bicuspid, between the two bicuspids and between the second bicuspid and first molar, was slightly swollen and a deeper red than normal, also a little shorter than normal. There were no fillings, nor cavities, in any of these teeth, but the contacts were not tight and food evidently crowded through on to the gum tissue at each meal. The patient was told that it would be necessary to place a filling in one of the teeth. He expressed great satisfaction that something wrong had been discovered, and he added that at almost every meal he had eaten in ten years he had suffered pain caused by every attempt to chew on that side. He also said he had complained again and again to his dentist, but on each occasion he was told that he needed no dental service. A separator was placed between the second bicuspid and first molar, and it required very little movement to close the contacts between the two bicuspids and between the first bicuspid and cuspid. A mesio-occlusal cavity was then cut in the first molar and a gold filling placed, building out the mesial contour sufficiently to keep all three contacts tight. There never was a more appreciative patient than this man. His daughter of sixteen has since told the writer that a little jar of toothpicks, which had for years occupied a place on the table near her father's plate, has been dispensed with. Dozens of similar cases might be mentioned.

Where there is an open contact, causing food impaction, it is clearly our duty to close it, by whatever procedure seems best. It is not often necessary to cut a cavity in a sound tooth. Sometimes casts of the mouth will show that a certain cusp is striking in such a way as to force a contact open and a little grinding of the planes of one or two cusps will permit the closure of the open contact. Oftentimes the open contact is due to a

"flat" filling in a neighboring tooth, and it will be necessary to correct the contour of the filling, either by replacing it or building it out. As in the case mentioned above, several contacts may be tightened by building out a single surface, and where there are open contacts there are usually fillings in nearby surfaces. If there is any one thing which more than all others has contributed to our failures to restore proper contacts in our operations, it has been our neglect to secure proper separation previous to or in connection with the placing of crowns and proximal fillings. The records which have been collected show an entirely too large number of inflammations from this cause.

It should be recognized that some cases present in which it will be inadvisable to attempt to maintain tight contacts, particularly where teeth are gradually moving apart following the extraction of a neighboring tooth, or where peridental inflammations have progressed far enough to cause a continued movement. In a limited number of cases, where proper contact cannot be maintained, a tooth should be extracted. Most cases of this type are those in which a third molar is loose enough to permit the force of the bite to push it away from contact with the second molar and allow food to be crowded into the interproximal space. In some of these cases contact, if restored, will be maintained but a short time, and the best procedure may be the extraction of the third molar.

The discussion of the treatment of all of these cases should not be passed without mentioning the importance of doing whatever may be necessary in each case to promote the cleanliness and consequent health of the soft tissues adjacent to the teeth, in order to secure the best results to be derived from the fullest and most vigorous use of the teeth in mastication—which is only possible when all areas of tenderness or sensitiveness have been eliminated.

THE DENTIST'S DUTY IN COMBATING GINGIVITIS.

Consideration of the treatment of these conditions has been purposely limited to the treatment of gingivitis, for therein lies our hope for the future in combating diseases of the peridental membrane. Attention is now called to the fact that this work is not the work of the specialist in the treatment of diseases of the peridental membrane, but lies necessarily within the field of the general practitioner. He must be careful in his examinations of the mouth to make a record of the inflammations of the soft tissues; he must study the causes of these inflammations, and he must undertake at once the treatment necessary for their eradication and to prevent, so far as may be, their recurrence. He must at the same time be ever alert to the important part which his patients must undertake, and must be painstaking and indefatigable in teaching them the value of proper contacts and the serious conditions which eventually result from slight and seemingly trivial inflammations, to the end that he may secure and hold their co-operation in his efforts in their behalf.

In considering this group of diseases, attention is called to the large number of valuable contributions during the past few years to both medical and dental literature, by leading scientists, in which the relation of the local focus of infection to general systemic conditions is clearly established. The dental profes-

sion cannot turn a deaf ear to the declarations of these men. When a physician of known reputation in the field of clinical pathology,* announces positively several cases of death from endocarditis due to peridental infection, and other men, such as Mayo† and Billings,‡ have expressed themselves so positively on the relationship of the pyorrhea pocket to many serious lesions elsewhere, it is surely the duty of the dental profession to prevent and to eliminate such foci from the mouths of their patients.

In closing, let it be said again that the dental profession is not so much in need today of more specialists in the treatment of pyorrhea as it is of more dentists who will make it their specialty to prevent disease of the tissues attached to the teeth.

Discussion.

Dr. Henry L. Banzhaf, Milwaukee, Wis. I can hardly hope to add anything of great value to this splendid paper, except possibly to emphasize a few of its important items.

We all realize that the future of dentistry depends upon the young men in this country. From Maine to California we have groups of young practitioners doing scientific work, following in the footsteps and extending the work of our older scientists, and I think we should show our appreciation of their efforts. I take great pleasure at this time in expressing my appreciation of the character of the work that is being done by our younger fellow practitioners, and of the character and quality of the work that is represented in this paper.

Until three or four years ago, I was greatly distressed with the free deposition of salivary calculus upon the lingual surfaces of the lower teeth and the buccal surfaces of the upper molars in my own mouth. For reasons which seemed important to me at that time, I gave up the eating of three meals a day, and for three years and more, except on specially festive occasions, I have limited myself to breakfast and dinner, and have since had very little trouble, if any at all, in keeping my teeth clear of these deposits.

It appears from what the essayist says that it does not make very much difference what the quality or character of our food may be, but that the quantity we eat is the important factor. So, after all, we are brought back again to the old thought of faulty alimentation, faulty metabolism, and perhaps most of our patients, as well as we ourselves, eat too much.

The essayist's slides showing faulty contact points have greatly interested me. It is always a source of astonishment to me that some dentists, after repeatedly listening to complaints of food packing between the teeth, can make the remark to their patients, after having examined their mouths and with faulty contacts staring them in the face, "You require no dental service." This paper should teach us to realize that we should provide separation by the means at our command, since there is no excuse for any dentist allowing his patients to suffer from faulty contact points.

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* Edward C. Rosenow, *Dental Review*, vol. xxvi, 1912, p. 293.

† "Constitutional Diseases Secondary to Local Infections." C. H. Mayo, *Dental Review*, vol. xxvii, 1913, p. 281.

‡ "Chronic Focal Infections and their Etiologic Relations to Arthritis and Nephritis." Frank Billings, *Ill. Med. Journal*, vol. xxi, 1912, p. 261.

About two years ago I heard Dr. G. V. Black made the statement that he advised his patients to wash these food pockets with normal salt solution. I have followed this method for a period of a year or two with splendid results.

The new thought emphasized in the paper is that we should be careful and thorough in making our diagnoses of cases of gingivitis, and institute treatment before active and septic pericementitis has developed.

In many cases the occlusion on the right side is quite perfect, while on the left side there is an open bite or malocclusion due to malposed teeth. The essayist has called our attention to the fact that it is necessary to correct such malocclusion by grinding the cusps or removing a third molar which might be the cause of the trouble. Since the advent of the gold inlay and the improved methods of fitting crowns and making perfect contact points, it is certainly possible for us to practice preventive dentistry, and to provide our patients with occlusion on both sides, thereby preventing lesions due to the causes that have been pointed out.

The essayist has cited the warnings of Drs. Mayo and Billings in regard to the possibility of endocarditis resulting from peridental infection. While I have had no experience in the observation of that trouble, I have often noticed excessive nervousness in patients suffering from pyorrhea and exhibiting excessive deposits of serumal or salivary calculus.

We do not need one or two hundred instruments for curing pyorrhea; we do not need a larger army of men who are specially prepared to treat that disease, but we need a larger army of men with more earnestness, more scientific knowledge, and a better understanding of etiology, oral pathology and bacteriology, and the chemistry of digestion, men who will use their brain to practice preventive dentistry more intelligently.

Dr. Prime, Oxford, Neb. I would like to ask the essayist whether he knows any method whereby he can maintain contact when the first molar has been lost, and the bicuspids have separated as a result.

Dr. O. Homburger, Chillicothe. I would like to ask by what method the essayist would bring about contact between a second and third molar in the lower jaw.

Dr. J. R. Callahan. It is not customary for the chairman of a convention to enter into the discussions, yet I take the liberty to say that this paper, to my mind, is one of the strongest pleas for prevention. The great aim of all modern medicine and surgery, including dental surgery, is prevention. Here is a comprehensive plea in that direction.

A point which the essayist has mentioned, I have taken advantage of, and its adoption might be of benefit to others. When a patient asserts that he brushes his teeth thoroughly two or three times per day, and yet is unable to keep them free from stains and deposits, the dentist should have grave doubts as to the thoroughness with which his directions are followed by this patient. If he can impress upon the patient's mind that the stains and deposits, when they first lodge upon the teeth, are quite soft and can be easily removed by careful brushing, good progress will be made toward prevention.

Dr. Black (closing the discussion). I will first answer the questions which were asked. Dr. Prime asks how to restore the contact between the bicus-

pids when they have separated as the result of the extraction of the first molar. It depends a good deal on the conditions presented in each case what we should do. I am glad this question has been asked, because it gives me an opportunity to impress further the fact that we cannot have any set rule of procedure, but must institute treatment upon the evidence obtained in each individual case. There might be a case in which the second molar was pretty far away from the second bicuspid, and a cavity was present in one or both of these teeth; it would then be best to insert in that mouth a bridge which would serve to maintain the contact between the bicuspids and the anterior teeth. There might be the other extreme in which the second molar was very close to the second bicuspid, so that a filling might be placed in any one of the three teeth, which would serve to restore and maintain the contacts of all of them. In another case, if there were considerable space between the second bicuspid and second molar, and a slight space between the bicuspids, an examination of the occlusion might show that the second bicuspid had moved distally as far as it could, the planes of the upper teeth preventing it from further movement. In this case I might cut a cavity in one of the bicuspids, and build out the filling to contact.

There are other cases in which the movement of the teeth has been so great that food does not wedge between them. In such cases the patient might be better off if left untreated, because, if there is a wide separation between two teeth, food does not pack between them, and the gum septum will usually not be inflamed.

In answer to the question of Dr. Homburger, I would like to take a look in his mouth, because here is another individual case. Here is a man outside of our profession, and in a better one—viz, the ministry. I would like to inquire why he asked that question.

Dr. Homburger. Food has been lodging between these teeth; there has been no other trouble so far as I can discover, other than the discomfort of picking the food out.

Dr. Black. Here is a typical case. Perhaps we should extract the third molar, or possibly it would be best to cut a mesio-occlusal cavity in it and insert a filling or an inlay, making a proper restoration of the contact. Perhaps there is, as is quite common, a mesio-occlusal filling in the second molar, and separation was not resorted to in inserting it, therefore the tooth has moved too far mesially, in which case all or part of the filling should be removed, and another filling placed which would restore both the proper width between the first and second molars, and the contact between the second and third molars. It is our duty to study each case and find out what has brought about the condition which permits the impaction of food, and then do whatever is necessary to correct it, even though that may be, in some cases, the extraction of a tooth. In this case, if nothing is done, the patient may eventually lose both the second and third molars, because the peridental membrane will become diseased between those teeth, and be gradually detached from the roots. The infection which sets in may spread from that position all around the arch. I consider that there is no greater service we can do to our patients than to make careful examinations of the soft tissues, and correct these inflammations.

We should make an accurate record of the condition of the patient's mouth, aside from the cavities which are present. The examination should include an inspection of the free margins of the gums, and wherever there is inflammation present, it should be recorded, and its cause noted. The means of treatment of each area of inflammation should be recorded, and when the patient returns six months later, he should be re-examined to see whether the gingivitis has disappeared, which means an important accomplishment toward the prevention of pyorrhea.

A lateral abscess should be treated in just the same manner as any other abscess. An incision ought to be made to let the pus out, and after the abscess is once drained, the inflammation will subside sufficiently to allow the pus to discharge alongside of the root, as it has probably done for months or years before. To prevent the recurrence of such an abscess, it might be best to extract the tooth, or to cut away some of the tissue and thus eliminate the pocket.

Dr. Banzhaf speaks of the use of medicines. In my opinion, the day is past—though exception may be taken to this general statement—for the use of antiseptics in the treatment of diseases of the peridental membrane. What has been the indication for the use of antiseptics in the treatment of these diseases? The micro-organisms which we wanted to destroy. General surgeons used to argue the same way and to do the same thing ten or fifteen years ago; they now call that the age of antiseptic surgery. You will hardly be able to find a surgeon in the country today who is using that method. They do not use powerful antiseptics, because they have found that they do more harm than good, because any antiseptic which is strong enough to destroy micro-organisms is also strong enough to interfere with the healing process of the tissue. If a surgeon of today opens an abdomen in a case of appendicitis, and finds the appendix ruptured and the abdomen more or less infected with pus, he does not apply an antiseptic, but washes the abdominal cavity with sterile water or normal salt solution, for the purpose of removing as many of the micro-organisms as he can without interfering with the resistance of the tissues, thus leaving them in the best possible condition for working out their own healing. This is the age of aseptic surgery, and this treatment we should apply in infections of the peridental membrane. Only an experienced observer can appreciate the difference in the action of the tissues in response to this treatment as compared with their behavior following the use of the strong antiseptics which we formerly employed.

SECTION III:

Oral Surgery, Anatomy, Physiology, Histology, Pathology, Etiology, Hygiene, Prophylaxis, Materia Medica, and Allied Subjects.

Chairman—J. P. Buckley, Chicago, Ill.
Vice-chairman—C. V. Vignes, New Orleans, La.
Secretary—Leuman Waugh, Buffalo, N. Y.

TUESDAY—First Session.

The first meeting of Section III was called to order by the chairman, Dr. J. P. Buckley, Chicago, Ill., on Tuesday evening, July 8, 1913, at 8 o'clock.

The first order of business as announced by the chairman was the reading of a paper by Dr. Burton Lee Thorpe, St. Louis, Mo., as follows:

Prophylaxis.

By BURTON LEE THORPE, M.D., D.D.S., St. Louis, Missouri.

Dental literature of the present day is teeming with articles on prophylaxis. Yet nothing particularly new is advanced in them; we find only ideas as old as civilization itself, handed down from one generation to another and enlarged upon, in a new dress.

ORAL HYGIENE IN ANTIQUITY.

The necessity of the cleaning of the teeth was dwelt upon by the Egyptians, three thousand years before the coming of Christ, as an aid to physical beauty as well as a prophylactic measure.

The ancient Hindus, Chinese, Greeks, and Romans also preached and practiced mouth hygiene, and, I doubt not, were more familiar with hygienic rules than the average layman of today. To them a clean mouth was indicative of culture, cleanness, and health, as it is at the present time.

The Bible contains several references proving that the above assumption is correct. In Amos iv, 6, we find the children of Israel, 787 years before Christ, being admonished by Amos the prophet: "And I also have given you cleanness of teeth in all of your cities." In Gen. xlix, 12, we read: "His eyes are more beautiful than wine, and his teeth whiter than milk." In Prov. xxv, 19, we read: "To trust an unfaithful man in the time of trouble is like a rotten tooth and weary foot." Ecclesiasticus xix, 26, 27, says: "A man is known by his looks, and a wise man, when thou meetest him, is known by his countenance. The attire of the body and the laughter of the teeth and the gait of the man show what he is."

THE EVOLUTION OF HEALTH CONSERVATION.

The earliest writers on prophylaxis, such as Paré and Fauchard, as early as 1728 emphasized the need of a thorough scaling and polishing of the teeth by the dental surgeon, to be followed up by attention on the part of the patient. Joseph Fox, in 1806, re-emphasizes this need.

The practical application of several comparatively recent discoveries in medical science having been followed by remarkable benefits to the community, renewed interest has been aroused in "preventive medicine." This term is a technical expression. Although the general idea it is intended to convey is well understood, it is not an appropriate term, in the way in which it is frequently used. "Health conservation" is more descriptive, broader, and more expressive. Health conservation is "as old as the hills." Research of ancient records shows it to have been associated with the earliest beginnings of the human race. Moses, the Hebrew lawgiver—transmitting, no doubt, knowledge he had received as part of his education in the Egyptian court—gave to his people precepts regarding health conservation that hold good in this year of grace 1913. Much has been said of the advanced civilization of the ancient Egyptians, and especially of their knowledge of medical matters. The records, however, are meager; they are suggestive, but are fragmentary, and leave far too much to be inferred for them to be accepted as evidence. The Mosaic laws may justly be considered as embodying the best and most approved teachings of the old Egyptian medical leaders.

It is only in very recent years that medical science has unraveled the "reason why" underlying those ancient precepts. Step by step, very slowly indeed, as science and as the general intelligence of humanity advanced, and the masses appreciated the needs and means of betterment, "health conservation" attracted more and more attention and assumed an important position in all progressive communities. Cleanliness, hygienic living, good food, lessening the stress of the masses and placing a higher value upon human life, have all been factors tending to lessen human suffering and reduce the death rate; they have been health-conserving.

Inoculation, and later vaccination, may perhaps be considered the beginning of real preventive medicine; it was, however, a step in the dark. It has proved effective, beyond question, and yet, after many years, do we know the reason? During recent years medical science has achieved its most remarkable triumphs in conquering malarial disorders, ty-

phoid fever, and the fatal sleeping sickness, and in arresting the ravages of the hookworm of our southern states. These triumphs have not come as a quick return to the expenditure of effort; they are the culmination of many years of close observation, the result of the untiring industry of many patient workers who, step by step, kept everlastingly at it until the goal was reached and the way made easier for further triumphs. The "reason why," in all these cases, is well understood; the mystery has been solved, and the means have been made known by which these disorders may become of the past.

EARLY LITERATURE ON THE TEETH, THEIR DISORDERS, AND THEIR CARE.

"Oral prophylaxis," so called, is now to the fore. We are apt to speak of it as something new; it is merely a re-presentation or a new presentation of something very old. The world's knowledge has been constantly advancing, old ideas are coming to the fore in a new dress, and are looked upon from new viewpoints. They assume new importance—at first, perhaps, an exaggerated importance. It takes some time to bring to bear the records and experiences of the past and compare them with those of the present, and to determine where and how they differ, and, if they differ, whether they show a real advance. We are hampered in this comparison by the mutilated condition of the older records. The originals have all been lost. They have been copied, revised, and brought up to date so often that they are practically without date, and of uncertain authorship.

Again, we must remember that the world has had its "ups and downs." Civilization has had advances and lapses. Barbarians have now and again broken in upon highly cultured people, and swept them and their advanced ideas from the face of the globe, and we know them only by careful search of their ruined and buried cities. All through, however, enough has been discovered to show that from the very earliest days of the world's history the teeth have been recognized as a marked feature of the human face. Regular teeth have been universally recognized as a mark of beauty; the loss of the teeth has been considered a disfigurement, and their decay deplored. We do not know when medical literature began. The oldest record extant is a text-book, a revision of a previous one by an unknown author. In this we find references to show that the teeth, their importance, disorders, and treatment was duly considered. The fullest and most reliable of the old records are the texts of the Arabian medical writers. Many of their names have come down to us, and, as they and their teachings dominated the medical world for five or six centuries, they have had many revisers whose works are preserved in medical libraries. They all contain a more or less extended chapter upon the care and disorders of the teeth. They make very interesting reading, especially for those interested in oral prophylaxis. We are admonished to give the teeth daily care, to remove promptly from between them particles of food after eating; to avoid sweet or sour or sticky food, to guard the emotions, to beware of articles of food that put the teeth on edge, to avoid using them on hard objects, and to avoid certain articles of food supposed to have a harmful effect upon the teeth. That uncleanliness of the mouth and teeth contaminates the food and leads to serious systemic disorders

was well understood, although the why and wherefore may not have been known.

Martial on Teeth. Martial, the Roman poet, society man, and politician, who lived during the first century of the Christian era, and whose works have the unique distinction of being much better preserved than those of any of his compeers, gives us a little insight into the dentistry of his day. The older dental writers cite him as a dental writer, but in that they err. He speaks of sponges for cleaning teeth, of the joke of presenting a package of tooth powder to one having no teeth, of artificial teeth, and he refers one of his characters to a repairer of teeth. He speaks of toothpicks, and pokes fun at an old discarded society man who was frequently seen after the lunch hour conspicuously picking his teeth, but who had no teeth to pick. He also recites a case of what we would now probably call pyorrhea, absolutely cured, in the good old-fashioned way, by two vigorous coughing spells; the patient coughed the teeth out. This individual was almost as unfortunate as old Cervantes, the author of "Don Quixote," who in describing his own face makes his misfortune the basis of a very old joke. The main feature of his description was: "Two teeth in bad condition, unfortunately not placed properly so as to be opposite each other."

SPANISH, GERMAN AND FRENCH EARLY WRITINGS.

The oldest Spanish dental work extant is a family dialog on the importance and means of keeping the teeth clean, with illustrations of instruments for removing tartar and cleaning the teeth. A work intended for the laity appeared about 1555. The first German work on the teeth, dated about 1480, which seems to have been on the market in various editions until about 1620, is of the same order. Its wording is quaint, but on some points it would pass muster today. It is mainly made up of quotations from Arabian medical writers of a thousand years ago. The first French, English, and American dental works likewise treat of the care of the teeth, their importance to our well-being, and what should be done to prolong their usefulness; indeed, there is a host of dental publications that deserve to be better known than they are, written for the instruction of the public, professing to teach how the teeth can be preserved in comfort and usefulness from infancy to extreme old age. The general principles of these instructions are the same in all these works, and closely agree with accepted practice of today. Fauchard's excellent work was written by a dentist expressly for dental students, and goes more into the technique of mouth prophylaxis. We may be more thorough, we may have better instruments, we may medicate to better advantage, but how far have we advanced beyond the mechanical removal of deposits by instruments and abrasives, gum massage, and the application of remedial agents to restore the soft tissues to a healthy condition, and when these fail—a handy pair of forceps as a specific? All these remedial agents Fauchard knew and taught. Most of us, if not all, would doubtless balk at his suggestion to use "one's own freshly voided urine each morning as a mouth-wash," notwithstanding its reputed virtues.

L. S. PARMLY'S WORK IN DENTAL PROPHYLAXIS.

Dr. Levi Spear Parmly, it may be said, was perhaps, of the dental practitioners

of his day, more nearly representative of the progressive dental practitioners of today so far as tooth preservation in its broadest sense is concerned. He taught dental prophylaxis, he was also dentist to several ladies' schools, and firmly believed in arresting dental caries in its first onset when systematic preventive care failed. He gave lectures in his parlor to which he invited mothers and those having the care of children. He published several works giving instructions regarding the care of the teeth, one—and a well-written one—of "vest-pocket" size. As early as 1817 he was denominated the "Apostle of Dental Hygiene." He wrote and published (signing himself "Dental Professor") a series of brochures on "The Care and Treatment of the Teeth." His one theme in all his writings was *cleanliness*. He presents, however, no other means for attaining it than those well known long years before he wrote, and that essential of today, viz, surgical means.

CONFESSED FAILURE OF ORAL PROPHYLAXIS.

It will be well to take these citations to heart; to bear in mind that oral prophylaxis is not new, but at least a thousand years old, and that, notwithstanding its long preachment, dental caries is far from being a thing of the past. It is generally conceded that preventive measures and advances in the technique of the medical profession have, during the last few decades, added several years to the life of a generation. While our profession has advanced greatly, what has it accomplished in the same line? As a result of their profession's advancement, medical men have far less to do. Is that the case with the dental profession? If not, why? It is generally conceded that in order to meet properly the demands of the community, more dentists are needed and more dentistry must be done. This is a candid confession that our prophylaxis has failed to produce practical results. It is high time that we overhaul the past and revise our forecasts of the future in an earnest effort to ascertain the reason why.

No treatment, internal or local, has yet been discovered as a panacea for the removal of oral accumulations or for the cure of mouth diseases. The surgical removal, only, of deposits, and brushing, polishing, and massage, both by the dental surgeon at stated intervals and later by the patient daily, is the only known method. The mass of our profession call to mind the old family physician who, when asked, "Do you treat the skin?" answered, "Yes, and everything in it." The average dental practitioner attempts every operation incident to disease in the oral cavity. Yet in many cities, it is true, the practice of dental surgery is divided into specialties, viz: Oral surgery, orthodontia, prosthodontia, operative dentistry, extraction of teeth, and prophylaxis. The latter treatment, consisting of the hygienic care of the oral cavity—which is only a cavity when the jaws are opened wide; when closed, this so-called cavity is filled with tongue, teeth and muscles—is, of all operations incident to dental procedure, in the writer's opinion, the most essential.

RECENT ADVANCES IN ORAL HYGIENE.

Since medical inspection of public schools was inaugurated a few years ago, dental inspection has gone hand-in-hand with it, and now is recognized to be as important as medical inspection. It

was inaugurated in Germany, in 1888, where the wonderful pioneer work of Jessen at Strasburg first opened the eyes of the dental world to the realization of the possibilities to be accomplished. Already in America are some 200 school dental clinics, and dental inspection is being carried on successfully. The marvelous findings of the Cleveland and Rochester school clinics are proof beyond dispute of the necessity and value to be derived from this great work. On a new line of prophylaxis the school inspection has been inaugurated; and this turning to the children, teaching them how to care for their teeth, arresting decay as soon as it begins in their teeth, is the new prophylaxis that promises much better results than were obtained by the old. The old was remedial, the new is to be preventive. This is a broad distinction, and is to be the most valuable—as a generation to come will prove.

The beneficent and philanthropic gift of $1,000,000 by Thos. A. and John Hamilton Forsyth of Boston toward the erection and maintenance of a dental infirmary for the free care of children's teeth has been another great aid in spreading the propaganda of prophylaxis. The masses as well as the dental profession have been educated in the benefits of mouth hygiene by such journals as *Oral Health, Oral Hygiene, the Dental Dispensary Record,* and by the many articles published in our periodic literature, all of which have been of far-reaching influence and of inestimable value. The knowledge has been augmented by lectures in public schools, medical societies, nurses' training schools, mothers' clubs, etc., which have materially helped in educating the laity.

The appointment, by the Commissioner of the New York State Board of Health, of Dr. H. L. Wheeler and Dr W. A. White as consultants and lecturers on oral hygiene in 1911, the appointment of Dr. Chas. H. Oakman, by Governor Chase S. Osborn of Michigan, as a member of the Detroit Board of Health in 1912, and the recent appointment, by Governor Cox of Ohio, of Dr. Homer C. Brown of Columbus as a member of the Ohio State Board of Health, constitute a gratifying recognition of dentists, showing that both medical and executive authorities know the value and necessity of mouth hygiene and that the dental profession has at last "come into its own."

The latest contribution and one that will be of much value in aiding dental prophylaxis is the inauguration, by the National Dental Association, of the Scientific Foundation Research Commission, whose real mission is to solve the problem as to cause and effect. All of these items are mentioned to point out that the profession in America is fully awake to the great need and opportunity of the day.

A REGIMEN FOR SUCCESSFUL ORAL HYGIENE.

The dental surgeon's real duty is not to see how many teeth he can fill, but how many he can save from decay. Another of his duties is to bring about a healthy condition of the mouth, either by surgical or therapeutic treatment; but his responsibility is not fully discharged until he has educated the patient to devote the necessary personal attention to maintaining a healthy condition after it has been re-established. Much of our success depends on the cooperation of our *clientèle.* The education of the patient in the daily use of the brush will not, however, insure success

for the dentist, or the saving of the teeth, if the patient depends alone on the brush and on so-called antiseptic washes or pastes. One of the greatest fallacies ever foisted on the public was the catchy slogan of a few years ago, "A clean tooth never decays"; yet this slogan, although exaggerated, has acted as a danger signal and has had much to do in awakening the public to the need of mouth cleanliness as a prophylactic measure.

After the removal of all deposits and the thorough polishing of the teeth and treatment of the gums, the patient should be instructed in the future necessary regimen that insures a cleanly and healthy condition of the mouth. A careful explanation emphasizing the necessity of daily effort on the part of the patient is time well spent, and an absolutely essential requisite—for, if the patient does not assist the operator by keeping the mouth in a hygienic condition, the time spent in explanation is lost, as will be the patient's teeth.

THE BRUSH.

The time has come when carrying a tooth-brush in one's vest pocket is no more an indication of a clean mouth than a wig is an indication of hair. The use of the so-called tooth-brush should be discouraged by the dentist, for it is used superficially by the majority, and its improper use causes more harm to teeth and gum tissue than good. In its stead a *mouth-brush* should be prescribed, viz, a brush with a flat surface, four rows of stiff bristles, and the patient should be taught to properly brush and stimulate the gums, cheeks, lips, and palate instead of just brushing the teeth. Brushing the teeth crosswise should be discouraged, and the patient should be instructed properly to brush the gum tissue of the upper teeth labially and buccally downward, and, beginning on the palate tissue, lingually forward toward the gum margin; and to brush the lower teeth labially and lingually upward, the friction of the brush forcing the gum tissue toward the gum margins. Emphasis should be laid on the necessity of brushing and cleansing all mucous tissue of the mouth, for this is as essential as are clean tooth surfaces. If the mucous tissue be thoroughly cleansed in this way, the teeth cannot escape being cleansed also. If the patient has pyorrhea, then a specially adapted brush is indicated. The brush designed for that condition by Dr. J. J. Sarrazin has been found by the writer to be exceptionally suitable, as also is the brush he has designed for patients who have bridge work. But in mouths neither afflicted with pyorrhea nor containing bridge work, which is always unhygienic, the mouth-brush and its proper use is the greatest aid to the operator in the saving of the teeth. Personally I do not want my patients to use a brush that possesses no point of merit except the hole in the handle.

TONGUE-SCRAPER.

In frequent cases the patient presents a constipated, furred tongue. The dentist should call attention to this condition and prescribe a tongue-scraper, which, if used daily, will remove the furlike coating of mucus, so injurious to the patient's teeth and breath. The S. S. White Dental Mfg. Co. offers an excellent celluloid tongue-scraper, as do Katz & Besthoff of New Orleans, who market the tongue-scraper designed by Dr. J. J. Sarrazin. With either of these the tongue may be thoroughly cleansed

temporarily, but the patient should be referred to a specialist to ascertain the cause for and to rectify the condition described, which is presumably due to disorder of the stomach or bowels.

TEN PER CENT. SILVER NITRATE SOLUTION.

After scaling and polishing the teeth, the best remedy the writer has hitherto discovered for healing sponginess, for shrinking and hardening the gums and removing sensitiveness from the necks of the teeth, and absolutely preventing new caries, is a 10 per cent. solution of silver nitrate, which may be applied freely to both teeth and gums on a large pledget of cotton. Although this is cauterant, turns the mucous tissue white, and causes the epithelium to exfoliate, it is not an injurious cauterant; it only shrinks and hardens the inflamed tissue and stimulates it. It also stains the enamel of the teeth temporarily; this stain, however, may be easily removed at a subsequent sitting with powdered pumice and polishing buffs.

A caution. In mouths which contain teeth filled with silicate or porcelain inlays, before applying the silver nitrate solution these fillings or inlays and the tooth margins should be dried and coated with a film of sticky-wax, such as is furnished by the manufacturers of synthetic cements for coating fillings after insertion. This prevents the silver nitrate solution from penetrating inlay or silicate filling margins and permanently discoloring them. The 10 per cent. silver nitrate solution positively arrests or prevents decay, if cavities are painted with it frequently, and it is especially useful in deciduous teeth. Although it stains these cavities permanently black, if the loose carious portions have first been removed, and the cavity margins have been rounded saucer-shaped with a stone in the engine, the teeth can be saved from future decay and will not need filling.

This has been proved in the clinics of Europe, where, by its use alone, deciduous teeth have been saved, without filling. As a preventive of caries, it has also proved invaluable in the writer's practice for the past fifteen years.

THE TOOTHPICK.

While the toothpick habit is indulged in by all classes of society, and is especially noticeable in public dining rooms, it should be discouraged both as one of the vulgarities of American civilization and as a habit extremely detrimental to mouth hygiene, by the dentist, who should be a teacher and who has to be a preacher to drive home some of the truths appertaining to the welfare of his patients.

The toothpick causes irritation and laceration of the gum septum, also the crowding of food particles and septic matter under the gum tissue, which results in chronic gingivitis and periosteitis. The use of the toothpick should be condemned, and floss silk or small rubber bands recommended as preferable and less injurious. In some cases of pyorrhea, a toothpick is needed to remove the food after eating; then a quill should be recommended.

TOOTH-POWDER.

The average tooth powder now on the market is valueless. Its main body is composed of precipitated chalk, soap-root, and some one of the essential oils to flavor it.

To keep the teeth free from stains and calcarious deposits, a powder is needed that has enough grit so that, combined with the friction of the brush, it will free the teeth of accumulations and stains. Therefore a powder containing enough grit for that purpose is here recommended. No fear need be anticipated in the use of such a gritty powder. Twenty years ago, Dr. J. Foster Flagg proved that the use of pumice powder was non-injurious by polishing the teeth of his woman assistant with it daily for five years.

The inside portion of the cuttle-bone, not the crystalline extraneous part, is a safe polisher for both enamel and cementum, provided that it be pulverized until it will go through a sieve with 120 meshes to the linear inch.

I doubt if powdered pumice, used as a daily dentifrice, is injurious, if the patient PROPERLY brushes the teeth. The groove so often found, worn at the necks of the teeth, is not caused by brush or powder, but by erosion.

GUM MASSAGE.

Gum massage should be urged by the dentist, and, if the patient will persistently and thoroughly use the thumb and forefinger to massage the gum tissue, beneficial results will follow. The dentist should caution the patient, however, to massage the gums from the periphery to the center of the mouth, on the same principle as general systematic massage should always be done. This is directly opposite to what the average patient does or the average dentist teaches. Instead of massaging, they only rub and stimulate the gums. Correct massage, scientifically and thoroughly done, will aid greatly in bringing about the desired results.

PROPER FOOD SELECTION.

J. Sim Wallace and H. P. Pickerill in their recent books both contend that by proper food selection the teeth can be kept clean and their structure strengthened, and be immunized to caries, as are the teeth of the lower animals, and of certain savage races who do not use any artificial methods of cleaning the mouth. It will pay those interested in the conservation of the teeth to study the findings of these two authorities.

The time will soon come when public health boards will demand cleanliness in the selection and serving of foods, and foods that contribute to the health and the strength of a nation will have the preference. Just recently an article has been added to the public health law of New York giving authority to the state Commissioner of Health to inspect and supervise all public places such as hotels, restaurants, dining rooms, dining-cars, steamboats, and public, charitable, and penal institutions, in which food is prepared, sold, or served; and he is empowered to adopt rules and regulations for the proper enforcement of this article. Violation of this is made a misdemeanor. This prospective hygienic demand probably will be adopted in the future by all states.

The laity are gradually being educated to the necessity of pure drinking-water, sanitary sewerage, hygienic living quarters, "swatting the fly," "fletcherizing," and other modern advances in health conservation. It remains for the dental surgeon to do his duty to educate the people to the great need and contribut-

ing value of mouth hygiene and oral prophylaxis.

Discussion.

Dr. J. V. Conzett, Dubuque, Iowa. Dr. Thorpe is versatile: not only is he an authority upon secular history, but his address tonight shows him to be as familiar with holy writ. The only text that I know of which would be applicable here is one used in Job, where he said, "I have escaped by the skin of my teeth," and so I think that, if I get through this discussion and shall have escaped by the skin of my teeth, I will be fortunate.

As we learn the value of the teeth and teach the relation of good teeth and healthy mouths to general health, the public will appreciate more largely the necessity for cleanliness in the oral cavity. We know today that a perfectly clean tooth will not decay, since it is necessary, according to the researches of Kirk, Black, and Williams, for the plaque to be deposited upon some surface of the tooth before there can be decay, and if the plaque cannot be so deposited, the teeth will not decay. The teeth can be kept clean, we know—but not surgically clean. They are kept clean naturally by the proper chewing of the food and the movements of the tongue, lips, and cheeks. The great reason why teeth are lost today, and the great reason for so much pyorrhea, is that we do not properly use the teeth. If we ate proper foods and used the teeth properly in masticating those foods, the attrition and friction of the bolus as it passes over the teeth would keep them in such condition as to render very rarely necessary the use of any of the prophylactic agents we employ today.

I will touch on only one or two of the essayist's items which I consider most important. I do not concur with him in the use of a gritty powder. I know that such a powder can be used without injuring the teeth if properly applied, but it is dangerous to put a tooth-powder of that kind in the hands of the public and let them use it indiscriminately.

Not a great while ago a gentleman presented himself to me with a case of so-called erosion. I found that he was using a gritty powder; he was right-handed, and the erosion was confined entirely to the left side. In a number of cases I have observed deep grooves cut into the substance of the teeth upon the left side, by the vigorous use of the tooth-brush with a gritty powder, the abrasions being located upon the left side because the patient was right-handed. Dr. Marsh has demonstrated the fact that we can use pumice-stone without injuring the teeth, and in evidence thereof he showed me his own teeth, which were in splendid condition, but he uses the tooth-brush and the tooth-powder properly; he brushes the upper teeth down and the lower teeth up, and does not use the brush across the teeth. Abrasive tooth-powders used in that way do no harm, but if used improperly I believe they will in time not only injure the delicate septal tissue, but also the teeth; the gums will be brushed away from the cementum, and then grooves will be cut in the cementum and dentin.

Dr. Thorpe has said that we must have the co-operation of the patient; and that is absolutely true. We cannot keep a patient's teeth clean unless he employs an intelligent method of keeping them clean after he leaves the office. I took one of my patients to task some time

ago because his mouth was always filthy, and scolded him because he was not using proper methods of keeping his teeth clean. His comment was, "What is the use? I am paying you to do that." I cannot keep a patient's teeth clean; it is absolutely impossible unless I am able to have people come to my office two or three times a day. This patient does not brush his teeth properly; he does not chew his food properly; he eats soft food, the remains of which lie about the teeth—and the result is that his mouth is in a filthy condition all the time. We frequently find that when we have done our best to get a patient's teeth in proper condition, and have cautioned him about the care of the teeth, he will lapse into the old filthy methods, and when he returns to us he will show plaques on many teeth. So, unless we can lay down precept upon precept, line upon line, here a little and there a little, daily preaching this doctrine of oral cleanliness in the home, the school, and everywhere, we dentists cannot inculcate these thoughts into the hearts and lives of our patients. Papers and meetings of this sort stimulate us not to become tired of preaching to our patients the proper and thorough use of the toothbrush and dentifrices.

Dr. Black demonstrated several years ago a method of cleansing the gingival margins of the teeth by the use of a strong spray from a bulb syringe, and I have used that procedure ever since. He uses a common chip-blower, fills it with warm water, and, running the nozzle around the gingival margins, forces the water underneath the gingival margins and into the interproximal spaces. The patient can do this himself after a little instruction. This mode of procedure is especially valuable for him if he has bridge work, because he can keep the bridge work and the interproximal spaces cleaner than in any other way. Another method which will accomplish practically the same result consists in filling the mouth with water, holding the lips together and with the muscles of the cheeks forcing the water into the interproximal spaces. If this be done at frequent intervals, the condition of the mouth will be improved very much. In pyorrhea also it is necessary for the patient to take care of the teeth after treatment. Recently I had two patients come to me who had been in the hands of two of the best practitioners in the country. They said that they had been treated by these men and discharged, and I asked them how long ago these dentists had seen their mouths, and they said it was six years ago. I asked if they had done anything since, and they answered, No. They thought they had been cured and had done nothing since. If these patients had gone back to the dentists at frequent intervals, and had themselves cared for their teeth properly between times, they would never have had a recurrence of the disease. It is therefore necessary that we should impress on our patients the importance of their co-operation, and not have them go away and forget what we have said, and then come back in a year or two with conditions almost as bad as they were originally.

I believe in massage of the gums, and think Dr. Thorpe has given us some splendid ideas in this regard. In this connection I would mention a little instrument designed some years ago by Dr. Alexander for vibratory massage which I have used with a great deal of satisfaction. This instrument is very agreeable to the patient, and, I believe, does

a great deal of good when used daily after prophylactic and pyorrhea treatment.

Dr. Jules J. Sarrazin, New Orleans, La. We have listened to an interesting presentation of the history of mouth hygiene from the remotest antiquity to the present day, testifying to the importance which, except during barbaric epochs, was attached to the maintenance of the health and cleanliness of the mouth. Ancient documentary support is somewhat fragmentary, owing to the destruction of priceless volumes and papyri from the library of Alexandria, which, had they become our heirloom, would no doubt have advanced all sciences by a few centuries, including dentistry and oral prophylaxis. If these documents had been preserved, the faithful practice of mouth hygiene, from childhood to the grave, to protect both the teeth and the general health, not only by improving masticatory function, but by guarding against extraneous infection, would probably by this time have become a recognized truth as trite as the heat of Kansas City.

Dr. Thorpe, in his panoramic paper, dwells more on the history of mouth hygiene, some of it quite ancient, than on proper modern technique, both at home and for office practice. However, some passages clearly hint at the similarity of an unclean mouth to an incubator for the rapid development of countless typhoid, pneumonia, and eruptive-fever germs and pus bacilli, all ready to infect the system the moment that arterial blood of good quality ceases properly to fill the tissues at the points of entrance of infection. Of course, leptothrix bacilli, when furnished with an excellent pabulum for growth, do not neglect to use the opportunity for breaking down tooth structure. Considering the necessity of maintaining a proper guard by means of an adequate arterial blood supply to the tissues, while their arterial hyperemia protects them in turn against local disease, several points must be given due importance:

First. Proper diet, hydrotherapy, and general hygiene.

Second. Exercise in the open air, to stimulate the heart's action while the blood takes in oxygen.

Third. Horizontal rest to allow the arterialization of tissues which are starved by too prolonged an upright posture.

Fourth. Massage so practiced as to repulse venous blood toward the heart.

The first two items require no comment beyond the fact that their importance is universally recognized, and that they must be varied according to the age and physical condition of the patient.

The importance and therapeutic value of horizontal rest has, as far as I know, received its first scientific explanation from Dr. Otto Lerch of New Orleans. In warm climates especially—and this should apply to Kansas City just now—columns of blood drop the more as the tissues relax, and the pump exhausts itself in an effort to keep the pipes above it properly filled. This explains why wrinkles form early in life, and why the upper portion of the body grows old first. The noon hour "siesta" of equatorial regions has resulted from experience, that unerring teacher.

Massage is really valuable by helping the veins to return the venous blood to the heart by pressure applied from the periphery to the center. The gums are no exception. All attempts at massage with a brush, rubber points, or a vibra-

tory appliance, may furnish some stimulation, but no more. Nature supplies the means, viz, the thumb and finger, applying pressure from the gum margins apically, thus forcing back the venous blood. The arteries are deeper, and will pump blood into the tissues thus emptied with each beat of the heart. Brushing done vertically, and perforce in a reverse direction so that the bristles sweep from the gums into the embrasures, does not massage, but stimulates the gum tissues, besides properly cleansing the teeth without wearing grooves at their necks. It is the horizontal (crosswise) brushing which wears such grooves, much more than any dentifrice employed. The deposition upon the teeth of inspissated mucus charged with epithelial cells, bacteria, and calcium salts, and particles of the creamy bolus of mastication, is the cause of nearly all dental ills. It takes more than any paste or dry precipitated chalk to constantly break up such deposits, facilitate their removal, and *polish* the teeth. On approximal surfaces a flat floss charged with an effective polishing powder, and elsewhere a *dry* brush charged with a powder of fine, smooth grit, are required. A powder containing some cuttlefish bone so finely pulverized as to sift through a sieve of 120 meshes to the linear inch, and appearing perfectly amorphous when its particles are magnified 600 times, is not only a safe, but an effective polishing agent for the teeth, because it readily breaks up plaques and films deposited upon them. Furthermore, brushes carrying such a powder into action must have lively bristles, must be small enough, and so shaped as to afford the greatest facility possible for the proper motion of these bristles and their free reach into otherwise inaccessible places. It is well enough to preach mouth hygiene to our patients, but it is a futile hope to expect them to do nearly impossible feats. They must be supplied with implements which facilitate their task if they are to do it thoroughly. A nail-brush is small enough to use in a washbowl, but an attempt is habitually made to use one but little smaller inside the mouth! What hope is there that it may reach between the cheek and the upper molars, and distally of the third upper molars, or gingivally and lingually of the lower third molars? Occasionally a real scouring should be instituted by means of an actively cleansing powder, the usual polishing to be afterward resumed. Pumice particles never completely lose angularity, no matter how finely pulverized, because pumice crystals are angular; but if reduced to the fineness just mentioned a powder containing a proportion of pumice can be used constantly, let alone occasionally, without the slightest fear of scratching the teeth. Of course, cervical grooves can be worn by continued, improper, crosswise brushing. They would be made by bristles alone. Dr. Miller's experiments were made by the revolution of bristles charged with gritty dentifrices mesio-distally of teeth.

In New Orleans many of us have for years grown rather exclusive as to the armamentarium with which we have our patients supplied, that they may practice mouth hygiene effectively. We have it all at home—proper tapes, brushes, powders and washes—and we do not even neglect the dorsum of the tongue, whence reinfection of the mouth so frequently occurs within a few minutes after it has been cleansed. We do not prescribe a

whalebone, however, or any other old thing which may, or may not, do proper service. Luckily, we are equipped with real tongue-cleansers, and we tell our patients how and when to use them. As a last step in the toilet of the mouth, we insist upon its being flushed out with a wash capable of stimulating the glands to do their own secreting of alkaline saliva. Dr. Thorpe mentions that Fauchard highly recommended the use of freshly voided urine as a mouth-wash, and I infer from Fauchard's apparent conviction on the subject that he must have obtained quite satisfactory results from that practice. It was economical, at least. Personally, I have no knowledge on that point, because I have never made the clinical tests necessary to obtain it, nor have I had such tests made by patients, but it may not be at all impossible that Fauchard's mouth-wash was in line with the studies of Pickerill, Kirk, and Black.

Dr. Thorpe (closing the discussion). I wish to thank you for your attention during the reading and discussion of my paper. In deference to Dr. Grieves, who is to read an excellent paper, and the discussion of which is to be opened by Dr. Hall of Kansas City, a celebrated pathologist, I will not say much in closing. We all have heard more or less of prophylaxis, and we all have our views in regard to it. It is our duty as dental surgeons both to teach and to practice this very necessary department of dentistry.

The next order of business was the reading of a paper by Dr. Clarence J. Grieves, Baltimore, Md., entitled "Dental Periapical Infections as the Cause of Systemic Disease," as follows:

Dental Periapical Infections as the Cause of Systemic Disease.

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The ills without number which have so recently been said to arise from oral septic conditions, the increasing mass of evidence, largely clinical, which apparently proves this contention, the imminent danger that our profession, after this great cry of "Wolf!" should argue that there is no wolf, and overlook the matter, not taking it seriously, or else take it so seriously as to hurry into the ruthless destruction of organs they have heretofore been so proud to restore and retain, only to find their error when the wave of hysteria has passed—all these and many other conditions prompt this paper.

The duty we owe our patients, that they may not suffer from systemic damage from any condition obtaining in the mouth, and still may maintain their dentures in health and function; the duty we owe our medical *confrère* who has been forced into mouth diagnosis admittedly ill prepared in oral pathology, so that he may know at least what we know; the duty we owe ourselves, that we may patiently stand the censure, ofttimes unjust; that our hands may be clean, our reputation *sans reproche*—these duties demand that we discuss this matter of systemic damage from focal mouth infections and arrive at some sane conclusion, on which we as a profession are a unit, and then stand by it without

indulging in the popular sensationalism which is next to treason to our high calling.

DEFINITION OF ORAL SEPSIS.

At the outset it would be well to have the condition termed *oral sepsis* well defined in our minds before entering into the question of its causes; the writer has quoted, and here quotes again, the very able work of J. F. and Stanley Colyer(1), who say:

The term "oral sepsis" is used not to denote a specific disease, but collectively to include all chronic inflammatory diseases about the mouth. With the onset and progress of oral sepsis, there occurs an increase in the number and variety of the organisms commonly found in the mouth, especially those of the pyogenic class. Under the altered environment many of these organisms may undergo changes in virulence, either in the direction of exaltation or of attenuation, and thus some which were previously nonpathogenic may become pathogenic. The catarrhal and suppurative products which result from the bacterial activity undergo partial putrefactive changes in the mouth, and in this condition are constantly passing into the gastro-intestinal tract, together with enormous numbers of bacteria.

The pollution of the alimentary canal by this septic material leads to an alteration in the usual intestinal flora, and to the presence of abnormal putrefactive products, and these together may induce certain changes in the economy of the body. Thus:

(1) The invasion of the tissue by organisms will be largely increased, and these organisms, which are said normally to pass through the intestinal wall during digestion, will be of an altered character.

(2) The new flora may act locally upon the walls, and induce a catarrhal condition and variations in the normal secretions, and so lead to a disordered digestion.

(3) The products of digestion and the usual putrefactive changes that take place in the intestine may be directly affected by the organisms, and unnatural products result.

Against this formidable attack the body possesses certain defenses, which may be divided into "local" and "constitutional."

The *local* defenses consist of—

(1) Phagocytosis in the mouth, the process being assisted by the positive chemotactic properties of the saliva.

(2) The antiseptic action of the gastric juice. This property depends upon the presence of hydrochloric acid, which is only present during digestion, and hence its action is intermittent.

(Pickerill(2) notes the fact that many organisms may pass through the stomach as spores, thus escaping its fluids, and then develop in the intestine.)

(3) The problematical struggle for existence among organisms in the small and large intestine. But little is known in connection with this question; it must therefore for the present be disregarded.

The *constitutional* defenses are those brought about by the reaction of the tissues to the action of bacteria and their products. Collectively they constitute what is known as the resistance of the body, and they vary in degree of resistance in each individual. As the effect of oral sepsis is to throw a continuous and increasing strain upon these natural defenses, it is not surprising that at times the defenses break down, and that constitutional changes of a marked character follow.

CLASSIFICATION.

Excluding other mouth disease, the causes for oral sepsis usually arising about the teeth can now be placed(3) in—

three large common groups of septic types, viz, dento-alveolar and peridental abscesses and the different stages of pyorrhea alveolaris from gingivitis progressively onward. We can now classify oral sepsis as follows:

(A) Tissue exudate and pus freely evacuated into the mouth from pyorrhea, fistulous dento-alveolar abscess, or from any freely draining surface; ingestion and ab-

sorption of pyogenic products via the gastro-intestinal tract.

(B) Tissue exudate and pus retained in the alveolus from chronic "blind" dento-alveolar abscess and peridental abscess; pressure absorption via the blood stream by metastasis.

(C) A combination of the foregoing in advanced pyorrhea and dento-alveolar abscess, or deep necrotic surgical areas, which only drain occasionally; pus retention below the level of drainage. Damage results by methods in A and B.

So it is to be noted that, barring the group of gingival infections called pyorrhea alveolaris, and next in importance as to frequency and virulence, stand the periapical infections, fistulous and blind dento-alveolar abscess occurring in pulpless teeth, and peridental abscess on vital teeth, not always periapical, but very necessary to this discussion.

CHRONIC FISTULOUS DENTO-ALVEOLAR ABSCESS, AND PYORRHEA, AND THEIR SYSTEMIC EFFECTS.

We shall consider first chronic fistulous dento-alveolar abscess with pus constantly discharging into the mouth, the chronic form under class A where the systemic and local damage occurs by the absorption and ingestion of pus, organisms, and toxins throughout the entire gastro-intestinal tract. The changes in the mouth fluids and tract have just been mentioned, together with the modus of local and body resistance, and we must remember that added to this guard is the toxicolytic action of the liver—that burial-ground for bacteria—and the antitoxic action of the mesenteric nodes. The percentage of flow of pus from chronic fistulous periapical infection, it also must be recalled, does not approach that of pyorrhea, where, if the whole denture be involved, the pus-producing surface amounts to several square inches; for usually there is a small extra-alveolar granulomatous sac firmly covered by epithelium which only discharges occasionally. However, the flow is more constant when it does start, and deep incubation away from the chemotactic action and dilution of saliva may produce a pus of greater virulence.

Besides the local effects in the mouth arising from the continual presence of pus and what might be termed the major surgical lesions such as periosteitis and necrosis, Ludwig's angina, and parotitis, we find the sinuses and pharyngeal ring with its contained tonsils involved, and frequently lymphadenitis of the neck glands. Hunter([4]) and others accentuate principally the gastro-intestinal affections which result—as septic gastritis, enteritis, colitis, proctitis, appendicitis, and cholecystitis—and it is probable, as Colyer([1]) and Pickerill([2]) have shown, that the dominant systemic effects are indirectly produced by the absorption of the abnormal products of an intestinal tract put out of order by the arrival of an excessive and unusual amount of organisms and toxins from the mouth—a type of intestinal putrefaction.

When the triple guard breaks down, intestinal absorption begins, and hematogenous infection from the blood stream occurs. This differs only in degree from the pressure absorption from the retention areas to be considered later. Thus Hunter([4]) mentions pleurisies, empyemas, nephritis, pyelitis, perinephritic abscesses, and ulcerative endocarditis:

The poisons act sometimes more on one particular tissue—for example, blood (causing septicemia, pyemia, anemia), or on a

nerve (producing severe mental and degenerative effects); sometimes the toxins act more on the organs of excretion—for example, the kidney (producing nephritis), sometimes on the skin (producing rashes), sometimes on the joints (producing so-called rheumatic swelling).

Another important factor in the patient's favor, and one making against the systemic toxicity of chronic fistulous periapical infection as compared to the gingival, is that the fistulous dental abscess is nearly always produced by local causes, pathogenesis in the tooth-root, and is amenable to local treatment, while the bulk of pyorrheal infection is a local, lowered cell resistance produced by some constitutional state or diathesis. Thus serious damage to and through the gastro-intestinal tract and by hematogenous processes is superadded to the defective diathetic state which produced the pyorrhea—promoting a vicious cycle, which occurs much more frequently in the pyorrheal than in the periapical infection, in which the patient is otherwise in health and can maintain that state unless chronicity be of long duration.

Further, periapical infections are generally due to one, rarely to more than two pathogenic organisms or the products of saprophytic pulp decomposition in the canal, while pyorrhea is notably a multiple infection, different organisms predominating in different pockets in the same mouth, and it is obvious that in the blood fight antitoxic factors are more easily prepared in the body, as in the laboratory, against one organism than against many. The experimental use of vaccines in each instance appears to be confirmatory of this statement.

Damage to the occlusion is another feature not to be overlooked. In pyorrhea this is grave and permanent, often affecting the whole denture, promoting a habit of bolting rather than masticating food, producing intestinal putrefaction of proteids in bulk, or a complete change of food habit to "slops," largely carbohydrate, followed by excessive intestinal fermentation, adding this element to the already disturbed intestinal flora; while in periapical infection, unless multiple, the occlusion is but temporarily disarranged, and may be shortly restored to the normal.

That chronic fistulous dento-alveolar abscesses are active in systemic and local disturbance we know to our sorrow, and the drainage of pus from them into the mouth, acting as has been stated, is most serious. But by far the greater damage is done when this is combined with absorption from the focal infection directly into the lymph channels and blood stream, for frequently the fistulous area is tortuous, pus burrowing in the line of the least resistance and draining only occasionally at a higher level, when retention is imminent.

ADVANCED PYORRHEA AND DENTO-ALVEOLAR ABSCESS AND THEIR EFFECTS.

This condition, under classification c, will now be discussed.

A clinical picture is necessary to a correct understanding of this statement. It was noted by Drs. Baer, Fayerweather, Ashbury, and the writer, and reported in the study of a number of cases in the Johns Hopkins Orthopedic Clinic([5]) that "The temperature in arthritics with chronic alveolar abscess will rise 2/5° to 1° whenever the superficial tissues heal over, closing the fistula and causing temporary retention." This implies pressure absorption of toxins, and that the opening of the fistula released that pressure, reducing the temperature. These

patients had infectious arthritis, their tissues and blood were not able to furnish the necessary anti-bodies to antagonize the particular infecting organism which produced the arthritis, and so sensitive were they to toxic absorption via the blood stream, that "skinning over" of the fistulæ for a day or more —a phenomenon commonly observed by all of us—would produce this pyrexial variation. While the continued ingestion of pus from two or more fistulæ undoubtedly added its quota of toxicity, it was not so perceptible, and we had the apparent paradox of the patient being better while ingesting pus, and worse when it was not swallowed but held in the tissues.

THE IMPORTANCE OF PREDISPOSING DIATHESIS.

The systemic disturbance produced, in the norm, by acute periapical infections or dento-alveolar abscess is well known to all of us, and in this instance is most instructive, *for the escape of pus into the mouth and its ingestion has not yet occurred; all of the pyogenic elements are "locked" in the tissues.* The responses of the defensive forces of the blood and tissues to a local bone infection are so familiar as to need no mention; familiar also is the fight made by the local cells, and the results following. Early in every type of infection, depending upon its virulence, before the local generation of toxins has by positive chemotaxis produced leucocytosis, and before the proliferation of connective tissue, by fibrosis, has walled-in the abscess, constitutional symptoms always result, in the norm. The malaise, pyrexia, chill, muscle pain, etc., are all indicators of the healthy body's response to the local call for help. It is precisely at this stage of acute periapical infection that the most serious systemic disease, in the writer's experience, has occurred, such as polyarthritis, myositis, septic neuritis, infectious albuminuria, and one case each of endocarditis and toxic anemia. In the normal, even such states in mild form might exist and shortly clear up, but it is significant that they rarely exist in the majority, and it is more than significant that, in these cases reported, they persisted as real disease long after the focal lesion had been blotted out; and there can be no doubt that a regular predisposition or diathesis exists in one out of the many so infected periapically. As far as the writer's work has gone, there is but one diathesis known to him, that termed arthritism, though there are many predisposing states, principal among which stand the individuals with a tendency to repeated attacks of influenza, and those Kirk describes as of the "toxin habit." This predisposition must not be confused with the results of pus absorption producing a low pyemia, and it is in no sense a metastasis inducing metastatic conditions in the organs, nor the lowered general cell resistance following wasting fevers, as the post-typhoidal infections, all of which predispose to focal infection. Neither must the patient suffering from true arthritis be confounded with the state of arthritism —which is here used in the diathetic sense of the hyperacid diathesis in Michaels'([7]) classification. When oxidation is low, and biochemical changes are slow, there is an increase in the organic acids and decrease in the alkalinity of the blood. According to Kirk([6]), to whose articles you are referred, there are two dental expressions of arthritism, viz,

erosion and pyorrhea, and a full classification of these diatheses as related to mouth types, compiled from other authorities, has been made by the writer([3]). There have been many misunderstandings in this connection, and it is important that a distinction be made between the patient suffering from true arthritis and the general body predisposition known as arthritism.

It is most important that these individuals should be protected against themselves, so to speak; every portal of entry should be anticipated, if possible, and blotted out; no time is to be lost in long treatments, and pus formation must be prevented at any risk. Let us cite a case: Mr. D., of arthritic family history and diathesis, presented three years ago with a rheumatoid condition, later found to have resulted from intestinal putrefaction, in which a first bicuspid filled twelve years previous, and always comfortable, was involved by a fistulous periapical abscess. Strange to say, both chronic conditions responded to treatment. After the lapse of a year, a lower right molar became infected, resulting in a blind abscess. During its treatment the left knee-joint was badly involved in a rheumatoid arthritis, which did not clear up for two months after the molar was extracted. The important point in this history and treatment follows: Two months ago an upper left first molar responded to pressure tests, was opened, drained, and the root work was found doubtful by means of two X-ray films; there was all the appearance of incipient periapical infection, and the next day the knee gave premonitory symptoms of another attack. No time was lost in treating this tooth; it was extracted forthwith, when the case cleared up, aborting the second rheumatoid attack. Anyone caring to question the conservatism of this treatment is hereby requested to make his choice between two months' suffering from rheumatoid, possibly deforming, arthritis of a knee, and the doubtful prospect of curing and retaining an abscessed tooth which is apt not to function and to light up again, or the loss of that tooth and no bad knee.

Hence the predisposing constitutional state, diathesis, disturbed metabolism—call it what you please—is the most important factor in these conditions, as it is in the etiology of pyorrhea, dental caries, or any chronic oral lesion. According to McRae([8]), "Every case of bacterial inflammation is a problem in which it is necessary to gage the virulence of the organism and the resistance of the patient." He claims that the differences between local and general infection are only in degree, and not in kind: "It may be considered that every organism capable of local proliferation is theoretically capable of being found in the blood stream, and that, in the case of organisms like the pyococci (with which we are most concerned), their presence or absence is due to the numbers of them that escape at any given moment and the antagonistic power of the blood and tissues."

TREATMENT IN ACUTE DENTO-ALVEOLAR ABSCESS.

That there are many elements of prognostic interest to the dentist in the amount of local damage produced by acute dento-alveolar abscess is obvious; it is well known that few such can be drained through the root-canal. The chronic fistula left being below that level, the question immediately arises as to just how long the cementum, in which

the apex of every tooth root is completed, can remain vital and be nourished, with its nutritional vessels and membranes, the peridental membrane, raised from it and the whole area floating in pus! There can be no difference between the necrosis which is bound to result in the cementum and that in bone as a septic focus, under the same conditions, except that bone will form sequestra which are exfoliated, while the cemental apex always remains attached by the dentin of the root, and cannot be sequestrated. Herein lies the crux of this whole question of the curability of dental abscesses, for in the major portion of such acute infections, which linger notwithstanding treatment, the cemental apex—which ideal pulp devitalization and root surgery leaves vitally nourished and sensitive—in these septic cases is hopelessly damaged, and remains practically a necrotic bone area firmly attached by the rest of the dental structures. So it is important to know, first, if this has occurred, and to what extent. This can be determined, in some degree, by X-ray films, after the acute stage is passed. Second, the loss of vitality is indicated by lost sensitiveness—at the canal apex not always a sure guide, but the best at hand. When the cemental apex becomes necrotic, either in chronic fistulous or in blind abscess; when it does not shortly respond to careful root-canal medication, filling, and fistulous drainage; when we admit that the nourishing medium is cut off from the peridental membrane side, producing necrosis, why go on interminably pumping medicaments up the canal? Why not ablate such areas by a clean apicoectomy, and if that fails, extract, as any good surgeon would?

The writer wishes here to record the statement that there is, to his knowledge, no medicament nor method, germicidal, oxidizing, or electrolytic, that will revivify the pericemental apex. If it be vital, the tooth is healthy; if it be necrotic, the tooth is next to doomed. This is the point in treatment where materia medica stops and good surgery begins, and this is the juncture at which we are deserving of censure. With the best of intentions, our conservatism has been most detrimental to our patients' health. The vitality of the cemental apex is too often damaged, in clean pulp removal, by medication or otherwise. A study of a few of these cases free from pus or any symptom whatever of infection will show the lacunæ of absorption greatly exaggerated—nature's effort at removal. At best, these otherwise normal teeth are but tolerated, and as far as the blood stream is concerned these apices are a nuisance needing its constant osteoclastic cell supervision; and at any time, by hematogenous processes, they may become the foci for infection.

BLIND DENTO-ALVEOLAR ABSCESS, AND ITS DANGERS.

The foregoing septic periapical foci of acute and chronic alveolar abscess rarely result, thanks to improved technique at the hands of the dentist. In fact, he is generally consulted too late to abort them, but the type we are about to consider—class B, blind dento-alveolar abscess, where all the infective element and tissue exudate is retained without fistula or sinus—almost invariably arises from some careless or unsuccessful effort to open, cleanse, and seal the root-canal. This type may occur immediately on opening a tooth previously filled, result from aborting the fistulous stage in an acute alveolar abscess, or directly after

sealing a root-canal apparently clean to every test, or may arise and persist years after roots have been filled short of the apex. Sometimes it presents on roots filled to the very apex. Numerous X-ray films attest this fact, but they do not distinguish between vital and dead cementum. It is the writer's opinion, from the specimens he has examined, that in these perfectly filled apices there was no fault in technique, but possibly from medication or other causes the apex becomes necrotic([5]):

> It is not deemed desirable to open again the discussion long continued of the sterilization and stopping of infected root-canals. When canals are accessible, or can be made so, all methods succeed which recognize the cardinal bacteriological and technical principles involved—*i.e.* thorough sterilization, not only of the canal proper but of the dental tubuli and canaliculi of the apical cementum. The closing of these microscopic afferent openings by a filling as proof-tight against any solvent action of the apical exudate as the caval filling is proof against saliva, will always give a tooth free from post-operative infection, if there be no dyscrasia. But many canals are not accessible and cannot be made so, and anything short of perfection in this apparently simple but in reality very complicated operation, where the best of technique and judgment fails at times, always means, even if there be a period of dental comfort, when the inevitable lowered cell resistance comes, a small apical pus area, all the more dangerous toxically because it is accompanied by little pain and is apt to be dismissed as trivial by the patient; the dentist is not consulted; but later the physician is asked to treat a series of obscure and distant symptoms, for which he fails utterly to find the cause.

Whatever the bacterial cause in the canal—pathogenic and toxins, or saprophytic and ptomains—the type of infection is low, whether left over from an acute condition or newly introduced and controlled to a degree by the local reaction. This is shown by the bulging of the alveolar plates, which are rarely perforated, and the persistent fibrous tissue out of all proportion to the symptoms, local and general. It is further established by the rules laid down by Adami and McRae([8]), which are most important to an understanding of this condition and its systemic sequelæ, that—"The fight against any infection is made from two sources—*i.e.* the *local cells,* largely mechanical connective tissue mesh proliferation or fibrosis, and by the *blood,* leucocytosis, formation of anti-bodies, etc." If the infecting organisms be of *low toxicity,* then the local cells are sufficient with little or no call on the blood for the formation of anti-bodies and no appreciable leucocytosis. This is typical of the blind alveolar abscess, shown by the large fibroses and small systemic disturbance. If the organisms be of *high toxicity,* the local tissue cells are quickly destroyed; there is liquefaction, hence small fibroses, and great response of the blood with antitoxins and marked leucocytosis, and great systemic disturbance. This is typical of acute and chronic fistulous abscesses. If the systemic reaction be normal, it is a far safer state than in the low type occurring in blind periapical infections, where we have the blood stream gradually sensitized for months by hourly dosage of toxins from the root-canal without the safeguarding formation of the active anti-bodies characteristic of acute infection. Let some slight increase occur in the infection from the focal area, and serious systemic disease is the inevitable result. This condition would appear almost to be a phase of anaphylaxis induced by continuous injection, extending over months, of toxins or ptomains propelled by the gases arising

from decomposition of pulp tissues, or of infiltrated periapical exudates rising in the partly filled canal. What the percentage of anaerobic root-canal infections is, we do not know; it must be very high, and judging from Hartzell's([9]) reported cases, a further study of this type is urgent, as it has all of the sensitizing features of the negative phase, promoting increased susceptibility to any infective agency. There can be no doubt that the dentist induces these low infections, which we consider more dangerous than the acute type, even in those without the predisposition previously described, by the use of germicides which are of low oxidizing power, or what is more likely, the failures of these medicaments or methods to reach all of the cultures in the canal—First, because of hurry in the operation; second, because of carelessness in opening and filling the canals to the apex; third, because of attempting to reach and fill inoperable canals, for a small percentage of canals can never be opened and sealed successfully. The writer firmly believes that, under any of these conditions, the common pathogenic organisms, instead of being destroyed, are only attenuated, just as they would be in the preparation of a vaccine in the laboratory, and in such states pass through the apex for a long period, cumulative finally in over-vaccination or real disease, generally of muscles and joints. As Dr. Rhein([10]) has remarked, there can be no more pernicious practice than the use of the so-called mummifying pastes. The root-canal, with its contained necrotic pulp, wet at the apex by the circulation no matter how dry or well sealed from the caval filling at body temperature, in which are sealed germicides of low or even of high oxidizing power, is an ideal culture tube for the formation of toxins and ptomains and for the attenuation of organisms to such an extent that they can be introduced directly into the blood stream, to which this tube leads, for months with so little local pain as to give the patient no warning. If the operator had carried his surgery and sterilization far enough, this condition would not have happened. This explains the fact that blind periapical abscess areas are always produced after some incomplete attempt at root-canal medication and filling. It also explains the important part these blind abscess areas play in the induction of distant disease which, at first thought, is out of all proportion to the small focal infection, and the lack of pain and local suffering is convincing that classical pathogenesis is absent or nearly so.

There is another fact confirming this idea: In the opening and drainage of the bulk of these blind periapical areas, occurring in every practice, in how few instances is there anything to drain? Rarely any pus or tissue exudate will be found in the canal, so the types of infection must be low indeed, and this feature has seriously interfered with the study of the organisms involved, for in only two or three, out of all the cases the writer has most carefully opened in the last four years, was it possible to obtain a specimen sufficient for experiment.

SYMPTOMATOLOGY OF BLIND DENTO-ALVEOLAR ABSCESS.

Two great dangers arise from the occurrence of these blind abscesses. The first lies in their chronicity, and in the failure of the dentist and patient to recognize them early enough for treatment.

The patient is astonished that such conditions exist in his mouth and frequently refuses treatment. The dentist needs to be convinced and impressed again and again; he should keep on repeating, lest they be forgotten, the words of Adami and McRae: "A mild infection gives off a certain amount of toxin, and this is carried into the blood and tissue fluids, but is so diluted that we see no general bodily change wrought thereby; we neglect such mild intoxication, but it is nevertheless present." The second danger is the difficulty in really draining and curing such cases after they have existed for some time. The writer admits that he has successfully treated but few. In these diatheses drainage does little good when there is nothing to drain; root-medication and all other methods fail, except surgery, apicoectomy, and extraction. As to the systemic effect and disease produced by blind abscesses, the histories of a large number of cases are convincing, while there are many of infectious arthritis, rheumatoid arthritis, and few of arthritis deformans, two cases of endocarditis and toxic anemia and neuritis. These were all of a milder type, but much more stubborn and unresponsive to treatment than the fistulous periapical focal areas. The greater majority were very sick patients indeed, but it was difficult to place their illness in any class; it might be said to be more rheumatoid than arthritic, more muscle than joint involvement. The almost invariable history of muscle pain, particularly in the back of the neck; the muscular involvement about the joint, rather than a true arthritis in the joint, which the patients call neuritis; the effect in the blood, as of low toxemia or anemia; the pasty complexion, loss of appetite, debility, night-sweats, loss of body weight; occasionally low fever, running for weeks, rarely more than 100° and frequently subnormal; the general malaise, which Pickerill([2]) aptly describes as "an increasing inability to do the usual normal day's work"; the striking resemblance to incipient tuberculosis, actually misleading in some instances—all these symptoms distinguish this type from those previously described under chronic fistulous conditions. Few cases can be found in which the general systemic infection can be said to arise *de novo* from the periapical infection. The following case, in which the writer was associated lately, occurred four years ago; it was reported by Dr. Gordon Wilson([11]), and is interesting, because all other focal centers had been obliterated.

PRACTICAL CASE HISTORY.

Mrs. B., forty-three years of age, had had one or more attacks of mild but typical acute articular rheumatism practically every winter since she was eighteen years of age. Prior to most of the attacks there had been sore throat, and at times attacks of quinsy which required operative measures. Although not physician to this patient, but simply a friend, I had seen her during the attacks, and when she was free from them; her throat condition at all times showed hypertrophy of both tonsils, with a general congestion of the pharyngeal ring. After much urging, she consented to have her tonsils removed, and for the three winters following their removal she was not only free from amygdalitis and rheumatism, but noticed a marked difference in her general condition and in her ability to take comparatively long walks. This winter she had another attack of rheumatic fever, the joints of the wrists, fingers and ankles being involved, and her family physician referred her to Dr. Wm. S. Baer for special treatment. Dr. Baer very kindly told me of his findings, which were that, in addition to the joint involvement mentioned before, he found that there was no evidence of inflammation

in the throat, as the previous operation had been absolutely successful. Although the teeth appeared to be in an absolutely perfect condition, as Mrs. B. had just had the dentist examine her teeth a month previously, and as she suffered no pain, yet, on pressure being exerted along the border of the gums well above their free border, an area of tenderness was noticed over two apparently strong and healthy teeth (upper left molars). An X-ray picture was then taken of these teeth, and there was found the distinct shadow, at the base of each, characteristic of pus formation; on withdrawal of these teeth, pus cavities were found. After the removal of the teeth there was a rapid and uneventful recovery from arthritis.

Six months ago this same patient presented with an abscess of twenty-four hours' incubation on the upper right second bicuspid, the roots of which were well filled, as the writer knows (for he opened them), having been in perfect health since the attack just reported. An attempt was made to drain and treat this tooth. In a few hours, the patient could not walk from swollen knees. The right hand also was involved. The tooth was hastily extracted, and the case cleared in one week.

THE FAR-REACHING EFFECTS OF "STRAIGHT" PERIAPICAL INFECTION.

The symptoms arising from "straight" periapical infection, when that can be diagnosed, are not so pronounced, nor so easily related as to cause and effect, as in other focal infections—for instance, via the tonsillar crypts, a lymphoid tissue where the streptococcal toxins are carried directly to the blood stream. The writer has seen a case of endocarditis of long duration, in a child, the patient being too reduced to chance a tonsillotomy, where the cauterization of the crypts varied the rising temperature for three days; not so with the blind abscess, buried in bone, where the absorption of toxins is much slower, but is far more stubborn when once begun, even apicoectomy or extraction requiring days to show results, and medication producing no result whatever.

Daniel([12]) emphasizes the fact that arthritis may be secondary to a disease in some other part of the body, even years after the subsidence of the primary infection, and the great majority of these cases were multiple infections, in which one or more portals of entry were involved, first, as most commonly associated, the tonsils, next the appendix, the genito-urinary tract and the gastro-intestinal tract, and particularly the pharyngeal ring and sinuses, in the coryzas and grippe colds or true influenza. Here we have the periapical condition as cryptogenic infection. This has been observed by every dentist—a common cold and sore throat, and an old pulpless tooth well filled for years, with a bad abscess via the blood stream; why should not a grippe or influenza, a tonsillitis, appendicitis, or any distant infective area develop similar results?

ILLUSTRATIVE CASES.

Two cases may be cited in illustration. Miss S., in whom a well-filled pulpless first molar, quiescent for ten years, developed a blind abscess, complained of what she called rheumatic pains in the leg and arm muscles. The surgeon found a chronic appendicitis, of what duration no one could say, for which he operated. The abscess persisted, as did the muscle pain, until the tooth was treated, when the case cleared.

In the case of Mr. W., the lower left second bicuspid, well filled to the apex

for six years, developed a virulent blind abscess following grippe infection with empyema of the antrum on the opposite side, both responding to treatment. These factors are reflected immediately in the diagnosis and treatment, which is by exclusion, and the patient has occasion to alternately bless and curse this day of specialists, for every possible portal or entry is explored by each specialist in turn—the sinuses and throat by the laryngologist, the gastro-intestinal tract by the stomach specialist, the appendix and the other organs by the diagnostic specialist, while the genito-urinary specialist and gynecologist play their part, as does the dentist in a thorough study of the mouth.

"The dental diagnosis in the cases reported([5]) was made for pulpless teeth by isolation and thermal change; for peridental defects by percussion and sound. The best results were obtained by high digital pressure in the commissures on the alveolus over the apices of all the teeth. Any spot showing the slightest tenderness (and this was not always indicated in the tooth proper) was X rayed. A study of these pictures was made with the patient in the chair, and the fillings, crowns, etc., removed from all doubtful teeth. Drainage and regular abscess treatment were established via all canals, and in some instances alveolar curetment and apicoectomy."

Gradually every focal infection is removed, and generally the tooth will persist long after the primary portal has been closed to further infection. The periapical focus now becomes the reservoir for pus absorption, secondary but just as dangerous as the primary portal.

A case in point may be cited: Harry A., ten years of age, suffering with recurring tonsillitis and six abscesses, some fistulous, some blind, on deciduous molars. He developed a slight attack of endocarditis; the tonsils were removed, with slight improvement in the heart valves, until the six teeth, which showed no sign of improvement by treatment, were extracted. This operation was followed by slow recovery.

It is most difficult to get the dentist to understand this multiple type of infection. He either reasons that the patient should recover soon after dental treatment, and if he does not, denounces the whole thing as a hoax, or goes to the other extreme, and says it is all lowered vitality, malnutritional susceptibility, etc., so, "What's the use, anyway!" the patient might as well have his teeth. It is sometimes very difficult to say which was the first focal infecting portal of entry in these cases, which are all chronic and complicated—the periapical or some far distant region, generally lymphoid in character; but of one thing we are assured, viz that, if once infected, none of the cases clear until the periapical focus be obliterated, be it primary or secondary reinfection.

To quote a case: Miss H., bedridden and confined to the house, and for years under the care of a stomach specialist, finally recovered from a severe intestinal putrefaction. Her joint and muscle symptoms were pain up and down the spinal column, particularly in the cervical vertebræ. Dr. Baer noticed a few slight joint changes about the vertebræ, not clear in the X-ray film. The writer saw her at home, and diagnosed a pyorrhea and six doubtful periapical areas, out of which, in the skiagraphs obtained, five showed defective canal work. Her dentist did what he could at the bedside, with little success. She was taken to a

pyorrhea specialist, who cleared the pyorrhea, with little improvement in health. She was then brought to the writer's office, where all the roots were thoroughly opened and drained, without result, except that the invasion of one canal was suspected as staphylococcal. Crowns and bridges were removed and two teeth extracted. In two weeks the patient could stand the journey to the office in the car, which had heretofore been impossible. Dr. Baer in co-operation with Dr. Dwyer began vaccination by mixed strains of staphylococcus, with marked improvement, which immediately fell off when the vaccination stopped. The three remaining teeth were then extracted, the vaccination continued at longer intervals, and now the patient can enjoy the full day on her feet and is normal in every way. It is worth noting that out of five of these teeth four were molars, and in only one canal was there the least symptom of a discharge; the pyorrhea was also greater about the molars.

ETIOLOGICAL AND BACTERIOLOGICAL CONSIDERATIONS.

This case is quoted at length for two reasons—*First,* to illustrate its vicious cycle, intestinal putrefaction, the absorption of ptomains via the intestinal tract, presumably producing a pyorrhea, the existence of five blind periapical areas due to bad dental work, and the absorption of toxins via the blood stream, one or both causes producing what came near being a permanent and fatal infectious spinal arthritis. Notwithstanding the vaccines, no results were obtained until all the dental portals of entry were cleared up. Which was cause and which effect we do not know. Fortunate the patient and more fortunate the operator who recognizes such a case so early as "to put his finger" on the primary portal of septic entry! *Second,* because of the convincing clinical argument which vaccination, as with these strains of staphylococcus, brings to bear on the cause of periapical infection. Many such cases confirm the writer's long held opinion, that the major part of root-canal infection is due to the staphylococcus; that the rare cases, which are nearly always fatal to the tooth, if not the patient, are due to the streptococcus, and that the increasing number of cases of recurring terminal infection occurring in well-filled roots is largely due to the bacillus of Pfeiffer, the influenza bacillus.

THE RÔLE OF EPITHELIAL CELL REMNANTS.

While not strictly periapical, the peridental or pericemental abscess, according to D. D. Smith, is a blind retentive infectious area, lying in the peridental membrane attached to teeth with vital pulps. The fact that the pulp is vital, and that these foci are absolutely isolated from bacterial contamination from the oral cavity, excludes the rôle of local infection, and allows an unprejudiced view of the results of infection via the blood from constitutional states or portals of entry elsewhere. Without going into the question as to whether these groups of epithelial cells are glandular or isolated cell rests of the external epithelium of the enamel organ, it has been shown that they have no connection with the mouth. The work of Dr. Black and the recent paper by Dr. Kirk([13]), in which he calls attention to the part these areas may play by reason of local lowered resistance in pyorrhea, the report of a case made thirteen years ago by the

writer where hematogenic deposits and pus were found in these cell rests associated with recurrent tonsillitis and the rheumatoid diathesis, impresses us with the great importance of their etiology, if for nothing else than to prove that a periapical tissue can be infected via the blood stream. We cannot fail to associate an early study of twenty cases made by Kirk, in which the pneumococcus was isolated uncontaminated from four such pus areas, with the statement by Coplin([14]), who says of the pneumococcus: "It is the specific causative agent in many coryzas and catarrhal inflammations of mucous membrane"—for a few cases have occurred in the writer's practice where peridental abscesses follow or are coincident with nose and throat conditions proved to be due to the pneumococcus. A large percentage of such periapical areas resulting in the loss of the vital teeth involved, occurred in patients affected by the "milk" epidemic of two years ago in Baltimore. The portal of entry in this epidemic was the pharyngeal membrane, not necessarily the tonsils, for it was just as virulent in those who had had their tonsils dissected out; the organism is now definitely known to be a streptococcal strain closely allied to, if not itself the pneumococcus.

As exactly the obverse of this modus of periapical infections, you are referred to the paper of Morris, where tooth extraction, *i.e.* the movement of roots covered by pus, had infected the blood stream, producing embolic pneumonia, as confirmed by the writer's case of Miss H., who suffered from a large chronic periapical pus area involving two upper bicuspids, and who, four days after the extraction of these teeth, without anesthesia, developed a pneumonia.

BRIDGE WORK AND THE QUESTION OF DEVITALIZATION.

Bridges have very rightly been condemned because of the necrotic areas resulting in pus foci lying in the peridental membrane of otherwise vital teeth free from fillings shaped to receive gold shells as abutment teeth. These have been associated with the systemic states here recorded by Rhein and others, and by the writer, who believes, judging from the location of these areas in specimens and X-ray and film studies, that they are these same epithelial elements, always of a lowered resistance, further lowered by the escape through the root of the products of a necrotic though not necessarily infected pulp well sealed under a gold cap, or from excessive occlusal stress; and probably they are infected, particularly in the diatheses mentioned, by hematogenous processes, just as in peridental abscess, becoming secondary focal septic areas.

This finally brings up the whole question of pulp devitalization, especially in regard to the construction of bridges, for it is well recognized that a well-adapted bridge abutment cannot be made, and the pulp retained, except occasionally. We have no other recourse than to treat and fill, as far as possible, the septic roots presenting, and, if this treatment fail, ablate the apex or extract, if necessary from a standpoint of health; but the writer has learned to dread the diatheses mentioned (those of arthritism and the toxin habit) in pulp devitalization and any root-work, and while recognizing the difficulty of the bridge question, he is rather inclined to agree with Buckley([15]) that too many pulps are needlessly devitalized, particularly under these conditions. There is, then, noth-

ing left but to avoid the bridge in these diatheses, and construct a partial denture. The extravagant, almost reckless attitude of many medical men who have taken an interest in this question is to be deplored; because focal infective areas were found about *some* crowns and bridges, they now look on *all* such with suspicion, create doubt in the mind of the patient, and frequently order them all removed or the teeth extracted. Now, we know that it is not the crown, but the root under it, which is at fault, and it were well if they would learn to discriminate, or at least to consult a dentist.

DISCRIMINATION IN TREATMENT IMPERATIVE.

It has been stated that the apices of many perfectly filled and treated roots, as far as dental knowledge can foresee, become reinfected via the blood stream, and the dentist has frequently been accused when not guilty. The writer wishes it understood that he is not one of those who can fill every root; he does not agree with Dr. Rhein that even fifty per cent. of blind abscesses, in this diathesis, can be really cured. He agrees, however, heartily that the greater proportion of these systemic phases occur as Dr. Rhein([10]) has said: "These may be the result in some case of bad judgment of the operator, in others of ignorance and incompetence, but in a large number of cases the condition is due to an educated dentist failing to give the time needed to perform an aseptic operation." He further makes it clear that this hurry is due to fear of offense to the patient by the necessarily high fee which these services entail.

There is, however, another and more serious view of the matter. We have drifted from the axiom that "Every tooth must be saved," to the practice that "Every tooth can be saved." We must admit to the patient and to ourselves that there are roots so tortuous as to preclude the removal of necrotic pulp and permit filling. Why attempt the impossible? Does the surgeon hesitate to amputate for fear of losing prestige, and leave necrotic bone areas? He does a clean operation, for which the patient thanks him even if it involves loss of function and disfigurement. If this be good practice in tissues of high reparative power, why should we hesitate to amputate or extract dental tissues, of a low reparative power, when we have at our command methods of replacement so superior to those of the surgeon?

CONCLUSION.

While too much cannot be said of the gravity of diseases proved to be the result of periapical infection, and while we can never foretell how serious the condition may prove to be, this is a full report of careful observation extending over more than four years of full practice and while acting as consulting dentist to many medical practitioners, including Dr. William Baer, with a large orthopedic practice. While the writer has seen but one hundred-odd such cases, and they were all multiple, except a very few which were primary periapical areas, no doubt Dr. Gilmer([16]) is correct in his statement that over twenty-five per cent. of all adults have alveolar abscesses in some form. But we do not believe that it necessarily follows that even twenty-five per cent. of this large number will show systemic damage from such abscesses, bad though they may be, and the immunizing powers of the blood and tissues must be recognized.

We cannot close this paper better than by quoting Dr. James B. Herrick([17]) who, in discussing Dr. Mayo's address, said: "It is easy to follow a fashion and jump to the conclusion that practically all of our obscure diseases may be and are due to small foci of infection. There may be, as the result of a fad, a too wholesale cutting-out of tonsils and extracting of teeth. While we should recognize that there is truth in this important lesson as to focal infections, we must not, in an extravagant manner, think that this accounts for all our chronic diseases. It means that in every single case we must individualize."

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Discussion.

Dr. FRANK J. HALL, Kansas City, Mo. Before I begin my discussion, I want to congratulate the audience on being the most courageous that I have ever seen; you are certainly good stayers when it comes to standing heat.

I am not going into any extensive discussion, for one definite reason; that is, because the paper has involved so many features that it is impossible to discuss them. Too many factors have been brought to your attention to permit of detailed analysis. There are, however, a few items that I may mention in regard to peridental abscesses, and they are facts gathered from the general principles of the study of purulent accumulations. First, we know that any tooth that has been diseased is more or less a foreign body within the tissues of the jaw, and we must carefully treat the cav-

ity that harbors a dead pulp, else sooner or later we will have the process of suppuration taking place in the environment of the tooth that has been more or less disturbed by the death of that pulp. Teeth that have been improperly filled and hastily crowned, sooner or later suffer from periapical abscess; and these periapical abscesses are not the result of infections from the blood stream, as is sometimes pointed out, but are due to local infections. The idea that many diseases arise from periapical abscesses is not borne out by experience. In the first place, the germs of many of the diseases mentioned, endocarditis, rheumatoid arthritis, etc., are practically never found about the teeth. Once in a great while we find some special variety of pathogenic organism there, but they are not micro-organisms that are generally involved in the suppurating processes of the teeth. The vast majority of periapical abscesses are due to our common pus-producing streptococcus. This, with the ordinary staphylococcus that causes pimples of the face, boils on the neck, and other suppurations, is present in every mouth, and readily flourishes in bone where the tissues are irritated by the presence of a foreign body. So we must view these conditions with some degree of common sense, and I do not think it is necessary that the dentist should worry himself about diseases of the system, but busy himself with a careful toilet of the root-canals which he is attending to. When the tooth becomes an offending member, its apex septic or necrosed, and is no longer capable of being sterilized by proper measures, it should be extracted before the necrosis becomes a serious menace to the life of the patient. I see almost every day dentists working on teeth that are hopelessly gone, with the alveolus in a state of necrosis, and they continue this until the bur has to be used to cut out the dead tissues involved. My opinion, therefore, is simply this—that a tooth with a putrescent root-canal is a foreign body, and must be rendered absolutely sterile before the tissues will tolerate it; when the tissues will not tolerate such a tooth, it is just like a thorn that has run into the flesh, which should be removed.

Dr. F. B. Moorehead, Chicago, Ill. I appreciate the fact that you have listened to a splendid paper, read under somewhat trying conditions, and I will not detain you a great while. There are four or five items that I wish to discuss briefly and hurriedly.

The first point the essayist emphasizes is conservatism. Dr. Frank Billings of Chicago read a paper not long ago on the tonsils as a focus of infection, and pointed to some lesions in the body which had their origin in tonsillar infection, and as a result of that paper there was a widespread removal of tonsils. The fact that infections may possibly arise from the teeth does not mean that all the ills of the body will be averted by the extraction of the teeth—nothing of the kind. That the mouth is an exceedingly important focus of infection cannot be denied—and I suppose, if we isolated the mouth and took it as a pathological unit, it would perhaps be the most prolific focus of infection in the body; but I would not have you run riot in the extraction of teeth. It amounts to malpractice to extract teeth which can be saved to the comfort and benefit of the patient. On the other hand, it is wrong to retain a tooth in the mouth that has lost its usefulness and may mean the patient's discomfort

and possible danger. We must weigh one possibility against the other.

The second point is the relation of the dentist to the physician. In this connection let me say that the physician is first in the medical world. Around him stand the so-called medical specialties, of which your profession is one. The physician is the vine and we are the branches, and it is up to the dental profession to see to it that the branch they represent is a luxuriant one and reflects credit on the parent stem. All through literature we find criticisms advanced on the part of the dentist against the physician, but we should just remember this fact—that the eye, the ear, the nose and throat, the skin specialist, and the other medical specialists, have each in turn to solve the problem peculiar to the field in which he is engaged. He need not expect anybody else to do his work, and we have no right to expect the medical man to work out the pathology of the mouth, or the technique of treatment in the mouth. That is our office, and we have no right to criticize the physician until we have produced a definite working pathology of the oral cavity and a rational treatment of the lesions of that organ. When we have done as much as some of the other medical specialties, our profession will stand related to the physician as it should, viz, as a contributing member to all medicine. We are not making any progress by ignoring the physician. I fear there is too much of an antagonistic attitude on the part of the dentist toward the physician. The less antagonistic we are to the physician, the better we shall get along with him. We must bear in mind that we must work together, that we are a part of the great healing art, and "Let us be brethren!"

There are two factors to be borne in mind with reference to infections—the virulence of the organism and the resistance of the tissues to it. These two factors must be estimated in each case. There are two types of dangerous infections of which Dr. Grieves has spoken: First, the acute infections in which the micro-organism gains entrance and quickly permeates the blood stream. The symptoms, however, are so well marked that it is not necessary for me to discuss them. The second type is the so-called subacute or chronic infections. It seems to me that the crux of this type of infection, represented by joint and other lesions, lies in the following fact: Given a focus in the jaw which is more or less perfectly walled off by a connective tissue capsule, inside of which are found granulations and rapidly multiplying bacteria which manufacture toxins. The antitoxin molecule found in the circulation is a larger molecule than the toxin molecule found inside the encapsulated focus. The toxin molecule, therefore, may penetrate the membrane and become free in the circulation, while the antitoxin molecule, being larger, may not gain entrance to the focus of infection. I do not think the danger from swallowing pus is so great as it is estimated by some to be. Not long ago there appeared in the *Journal* of the British Medical Society a symposium on the subject of the etiology, diagnosis, and medical treatment of gastric and duodenal ulcer. Some who took part in that symposium spoke of alveolar infection as contributing to gastric ulcer, believing that it was the pus directly transmitted from the mouth through the esophagus and stomach into the intestinal tract that did the harm. Dr. Rosenow of Chicago has produced

gastric and duodenal ulcers experimentally in animals. He takes the streptococcus viridans, the organism found most frequently in these mouth infections, and by raising its virulence to a certain point by animal passage he produces hemorrhage in the heart valves. By further changing the virulence, he produces hemorrhages in joints. Again, he produces small hemorrhages in the mucosa of the stomach and upper intestines. By this process, definite ulcers may be formed. Dr. Rosenow has done more than that; he has produced rheumatism repeatedly by raising this organism to a certain virulence.

There is one other point in this connection: Infections of long standing seem to produce a disturbance in the physiological balance, and the removal of the focus may not cure the patient. Certain tissue changes may become permanent and may not respond to any kind of treatment. I believe that in some cases the whole organism is so impressed that recovery may not follow the removal of the focus. This fact ought to serve as a warning of the danger of chronic foci of infection.

Root-canal treatment forms a most important chapter in the practice of dentistry, and I speak from experience when I say that a large number of chronic infections can be traced to faulty root-canal treatment. The treating and filling of root-canals is therefore a paramount problem.

Dr. Grieves (closing the discussion). I simply want to thank you for your kind attention, and beg your indulgence for keeping you so long.

Section III then adjourned until a later session.

WEDNESDAY—Second Session.

The second session of Section III was called to order by the chairman, Dr. J. P. Buckley, Chicago, at 8.30 o'clock Wednesday evening, July 9th.

The first order of business as announced by the chairman was the reading of a paper by Dr. H. B. Tileston, Louisville, Ky., entitled "The Application in Practice of What is Known Concerning the Diagnosis and Treatment of Diseases of the Dental Pulp," as follows:

The Application in Practice of What is Known Concerning the Diagnosis and Treatment of Diseases of the Dental Pulp.

By H. B. TILESTON, D.D.S., Louisville, Ky.

When it was suggested to me by the chairman of this section that I write a paper on the diagnosis and treatment of the diseases of the dental pulp, I was disposed to decline, for the reason that there appeared to be no justification for treating once more a subject which has had such classic treatment at the hands of scientific writers such as Prinz, Buckley, Black, Burchard and Inglis, Louis Jack, and others.

It would seem that such a vast fund of knowledge, organized, as it has been, into approximately a positive science, could need no further amplification at the hands of a modest practitioner who lays no claim to scientific attainments as an original investigator.

THE ATTITUDE OF DENTAL STUDENTS AND PRACTITIONERS TOWARD SCIENTIFIC THEORY.

It occurred to me, however, that after all the average dental practitioner is not unlike the college student in many respects. My observation as a teacher has been that students generally are apt to look upon the instruction given them from the rostrum as something quite apart from their practice in the clinic, and that, in their opinion, the so-called theoretical subjects propounded by the lecturer, while admittedly scientific, are only theory after all, and are too abstruse to be intelligently applied in practice.

Such, I apprehend, is the attitude of mind with which a large number of practitioners view the writings of scientific investigators upon the symptomatology and morbid anatomy of the pulp in their relation to the treatment of diseases of that organ. If they read such essays at all, it is with a sense of remoteness, a feeling that it is interesting if true, but that, even if true, it has no immediate bearing upon actual practice in dealing with aching teeth. It is much like reading an account of a battle in the Turko-Bulgarian war—it is too far off to touch them intimately.

Far be it from me to discredit the average intelligence of the average dentist. But we are all human and subject to human weaknesses, one of which is the tendency to take the easiest way and not to be hindered in our empirical practices by the restraints imposed by too deep a scientific comprehension of the whys and wherefores. If we get results —whether right, partially right, or totally wrong—and are satisfied, why not be happy?

Nor would I impugn the understanding of those who listen to the reading of this paper, many of whom are better informed upon this subject than I am; but this is not the audience to which this paper is primarily and ultimately addressed.

In view of these facts it occurred to me that a paper devoted to the discussion of the application in actual practice in treating diseases of the dental pulp, of what is known and published concerning

its pathology, might prove both timely and instructive—hence the title of this paper. In dealing with this subject it is my purpose to be as direct, simple, and plain as it is possible to be, so that language and conclusion may be clearly understood.

THE IMPORTANCE OF THE DENTAL PULP.

In the first place, there is noted a tendency on the part of many practitioners to place too light an estimate upon the value of a pulp to a matured tooth. It is doubtless quite generally recognized and conceded that it is a misfortune for a tooth to lose its pulp before the completion of its outer form. But it has been taught by some eminent authorities that from that time the pulp begins to degenerate.

It is true that the pulp continually decreases in size as the dentinal walls thicken, at the expense of that organ; but may not that process also be properly considered as a normal function of the tooth pulp rather than a degeneration? —for in the normal course of events it never entirely disappears, though it may be reduced to a mere thread. Even the teeth of very old people are found still to be vital. The tendency toward ruthless destruction of tooth pulps, which is far too general, can only be accounted for by the recognition of a general conviction that a pulpless tooth is as good as a vital one.

The devitalization of pulps is even resorted to by some as a "treatment" for hypersensitive dentin—a condition which does not necessarily mean that the pulp is diseased, and which, by intelligent treatment, may be controlled so that the filled tooth is made perfectly comfortable.

No better evidence of the value of the vital pulp to a tooth should be needed than the observation that the moment the pulp is removed, the tissues of that tooth begin to degenerate. It shortly becomes opaque, frequently discolors, sometimes very badly, it becomes more brittle, and the enamel in time readily flakes off from the dentin. It may not be more vulnerable than a vital tooth to the initial attack of caries, but when once caries is established, it runs a more riotous course. While such a tooth may be retained for many years, eventually the gum begins to recede from about its neck, the pericementum also shrinks, and the blackened roots stand exposed. Eventually the tooth becomes an irritant and nature casts it off. And all this while its vital neighbor still stands in all its pristine beauty and firmness.

The destruction of a tooth pulp would not be so bad, if one could always be sure that that ended it. But it quite frequently happens that the ghost of the dead pulp refuses to down, and continually rises up to plague us with the various ills that follow as sequels to the operation. The devitalization of the pulp may set up irritation beyond the apex of the root; the pulp may be imperfectly extirpated, or the roots not thoroughly filled, any or all of which may give future trouble, and these possibilities, these liabilities, should give us pause ere we venture to unnecessarily destroy the pulp of a tooth.

DECIDING WHEN A PULP CAN BE SAFELY PRESERVED.

Of course it is not possible to conserve all pulps, nor is it advisable in some cases even to attempt to do it. In general practice the dentist encounters pulps

in all stages of involvement, and it is often a point of nice discrimination to decide just when it is possible to save the pulp. A history of discomfort or even of pain in a tooth now and then, brought on by extremes of temperature or contact with sweets or acids, need not mean any grave involvement of the pulp itself. The teeth of some persons are so sensitively alert to any encroachment upon the dentin, that the slightest cavity is discovered by the patients themselves and accurately located before the dentist finds it in the usual way. In the majority of such cases the cavity may be safely excavated and filled at once, without fear of future discomfort.

If the dentin is quite sensitive, the cavity should be treated with phenol before inserting a metallic filling, which will have a tendency to modify painful shocks from temperature changes. Such medication is contrary to the dictum of Dr. Black, who says that, after a cavity has been prepared for filling, neither saliva nor any drug should come into contact with it. But hundreds of the older practitioners have long been in the habit of using phenol or wood creasote in cavities just previous to inserting a gold filling, and their operations compare favorably with any others as to permanence.

When a tooth that has had a metallic filling placed in it is found painfully sensitive to extremes of temperature, but immediately becomes comfortable when the temperature returns to normal, the fact need not cause any anxiety as to the condition of the pulp. In a very large majority of instances such slight shocks act as stimulants to the pulp, inducing a physiological activity of the odontoblastic cells, which proceed to deposit a layer of secondary dentin between the pulp and the filling; and on this act of protection being completed, the tooth is no longer sensitive to thermal changes.

ACTIVE HYPEREMIA.

The condition of temporary sensitivity referred to is often confounded with active hyperemia—a more serious condition, since it is a disease of the pulp itself.

While the afore-mentioned thermal sensitivity of a recently filled tooth simulates to some extent the latter condition, there is this distinctive difference—that, in active hyperemia, the pain is induced by temperatures much farther within the normal temperature range, and does not immediately subside when the temperature returns to normal. It is to be noted, however, that the pain does pass away in a short time, and the tooth remains quite comfortable until again disturbed by thermal shock—which differentiates active hyperemia from other more serious affections.

It should be observed just here, also, that in all diseases of the pulp, except when the pericementum is involved, the pain is more apt than otherwise to be reflex, and hence it frequently calls for a careful application of diagnostic tests to locate the real seat of pain.

In the absence of a particular tooth as manifestly the cause of the trouble, such as one with a large open cavity, or one with a large filling in it, it may be necessary to isolate each tooth with the rubber dam and apply to each the thermal test.

Having established the diagnosis of active hyperemia and located the offending tooth, the treatment to be followed is to remove the local cause and give the pulp what has frequently been called

"physiological rest," which means that it must be placed in such condition that it can functionate normally, when the odontoblasts will deposit secondary dentin to protect it, as stated above, after which it returns to health.

If a carious cavity be present, it should be cleaned of all decayed matter and dressed with carbol-eugenol, phenol and oil of cloves, Buckley's phenol compound, or some such soothing and antiseptic drugs, and the cavity sealed with a non-conducting material. If a metallic filling is the cause, it should be removed, and a non-conducting filling substituted. As an aid to the depletion of the pulp of the excess of arterial blood, counter-irritation may be resorted to, such as painting the gum over the tooth and for some distance about it with Buckley's refrigerant, or the use of a capsicum plaster.

The prognosis in active hyperemia is usually favorable. When the diagnosis has been definitely made out, devitalization is inexcusable.

PASSIVE HYPEREMIA.

In his classification of diseases of the dental pulp, Prinz does not mention passive hyperemia. Even if it be admitted, as it quite generally is now, that inflammation can occur without bacterial invasion of the part, there is still ample evidence, clinically, that such a condition as passive or venous hyperemia exists separately and distinctly from pulpitis.

Congestion of the pulp is a serious condition, and if stasis does not occur through strangulation of the bloodvessels at the apex of the root-canal, the pulp will generally have to be devitalized, for the prognosis is unfavorable, although occasionally a pulp that has been the seat of venous congestion will recover and remain alive and comfortable for many years.

The only reason why great care should be exercised in the differential diagnosis of active and passive hyperemia is that a pulp in the first condition may not be needlessly sacrificed, through thinking it to be in the second!

There are several definite points of difference in the symptoms of these two forms of hyperemia, relating chiefly to the character and duration of the pain. The anamnesis or past history should be carefully inquired into, when, if it be a case of passive hyperemia, the following facts will be brought out:

The tooth has ached intermittently for some time. At first the pain was brought on by contact with ice-water or cold air, but soon subsided when normal warmth returned. (The case at that time was one of active hyperemia, which always precedes the passive.) Later the pain would start when the tooth was exposed to either heat or cold, and was accompanied by a feeling of fulness; the pain was of a throbbing character. and when once started continued for hours and refused to be comforted by sedatives of any kind, but finally the tooth would cease aching, and would remain comfortable until again aroused by another shock. If the pulp is exposed and can be seen, it shows a dark color, like venous blood, instead of the bright pink of arterial blood. If these points can be clearly established, passive hyperemia is definitely diagnosed.

If the case is seen during a period of quiescence, and the cavity be carefully cleared of all foreign matter and soft caries and dressed with a soothing antiseptic sealed without pressure, it may be

that the pulp will resume a normal condition and can be preserved. This procedure should be followed in any case, for it is imperative to first soothe a congested pulp, and to keep it quiet for a day or so, before attempting to destroy it with either arsenic or cocain; otherwise the application of either drug will aggravate the pain without accomplishing the devitalization of the pulp.

PULPITIS.

Inflammation of the pulp, or pulpitis, is a far more serious affection than either form of hyperemia, because of the difficulty in treating it successfully and the great amount of suffering it entails. There is probably no other pain comparable in its severity to that of an inflamed pulp when there is no point of exposure, especially if accompanied by suppuration.

All the descriptive adjectives such as boring, throbbing, fulgurating, lancinating, diffused, and jumping, may be applied to the character of pain from an inflamed pulp in the acute form. It may be shifting as to location, at times reflected to the ear, then to the region of the eye, or again, centering in the guilty tooth; or it may be diffused over the entire distribution of the trigeminus at once. It is intermittent as to its severity, but never entirely ceases—a point which is pathognomonic of acute inflammation, distinguishing it from hyperemia.

The fact, also, that the pain increases upon lying down is distinctive of inflammation, as well as the fact that heat intensifies the pain, while cold has a tendency to lessen it. These latter phenomena, however, are true also in some forms of pulp degeneration. The migration of white blood corpuscles into the connective tissue of the pulp, while conclusive in its diagnostic value, is a post-mortem test, hence not applicable to ante-mortem conditions with which we are dealing.

The symptoms accompanying acute inflammation of the pulp are so pronounced that there should be no difficulty in diagnosing that condition. Relief is much more difficult to secure. Many a valuable tooth has been extracted in desperation under such circumstances, the loss of which has been a lifelong regret.

Where there is no open cavity present, the quickest method of relief is to administer a general anesthetic and drill into the pulp, remove at least the bulbous portion, place a soothing medicament, and seal the cavity. If a carious cavity is present deep enough to reach the pulp, the carious matter should be carefully removed, until the pulp is exposed, which can then be punctured. After the engorgement has been relieved through the hemorrhage, a soothing medicament will be effective, but not before. At a subsequent sitting the pulp is to be devitalized and later removed.

Chronic pulpitis is a low form of inflammation indicative of advanced degeneration, and, when the pulp is exposed, is apt to be accompanied by hypertrophy. Usually there is not much acute pain in chronic pulpitis unless the pulp is subjected to pressure through an open cavity, but there is a constant sensation of uneasiness in the tooth, which is sometimes not inaptly called a "grumbler."

With the ultimate purpose of destroying it, the pulp must first be depleted of its excess of blood, and if there is fungous pulp tissue, it should be excised, which will cause sufficient hemorrhage

to deplete the body of the pulp, after which an arsenical application will be effective.

PURULENT PULPITIS.

When a pulp becomes infected with pyogenic organisms, suppuration occurs either in an acute form, pulp abscess, or as the chronic ulceration. It is often difficult to account for the presence of pus germs within a pulp chamber which has no direct opening leading into the mouth, yet we have all demonstrated the presence of pus by opening into a pulp chamber through solid dentin or an impervious filling. Pus thus inclosed within the pulp chamber is diagnosed by the intense throbbing and boring pain, due to not only the pressure upon the nerve elements of the excess of blood accompanying inflammation, but that due to the increasing production of pus. Heat greatly increases the pain; an application of cold relieves it partially, but not completely. The tooth responds painfully, to some extent, to percussion. No attempts at sedation are in any degree successful until the pus has been released by puncturing the abscess, which, as mentioned above, may involve drilling through the tooth tissues or through a filling. In doing this, overheating of the drill must be avoided by having an assistant direct a stream of cold water upon it, and thus save the patient unnecessary pain. When the drill first enters the pulp, and pus follows its withdrawal, the sudden relief from pressure often causes a throbbing of the arteries of the pulp, and an almost unbearable exacerbation of pain, which, however, gradually grows less, after which the pulp can be soothed into comfort.

Ulceration of the pulp is not painful, because it occurs upon an exposed surface, hence the pus flows away without creating pressure. If the continual escape of the pus is obstructed by impacted food or an unwise attempt to stop up the cavity, the case becomes one of abscess with all the distressing features of that condition.

Before attempting the destruction of a suppurating pulp by any method, it is essential that the pus sac or ulcerating membrane be completely destroyed, and the inflammation controlled. If that be not done, even though the pulp might tolerate being sealed up, the exudate, composed of a small amount of pus or of serous fluid from the inflamed pulp tissue, will hold the arsenical application away from contact with the pulp elements, and the devitalizing agent will have no effect whatever.

Cocain anesthesia is out of the question in such a case, because the pulp will not tolerate the necessary pressure. Moreover, pressure anesthesia is unwise in the presence of pus infection, because of the liability of forcing bacteria into the tissues beyond the root-apex, causing acute alveolar abscess. The pus-forming membrane should be destroyed by the use of pure phenol or phenol-sulfonic or trichloracetic acid, after which the usual procedures may be followed.

PULP NODULES.

Burchard classifies the formation of pulp stones or nodules as a constructive disease of the pulp, but it is eminently destructive in its effects. These calcic masses within the pulp tissue are not due to any excessive activity of cells whose normal function is to build the hard tissues of the tooth, but are an agglomeration of calcific material, held

in solution in the pulp, about centers or nuclei; the cause of their formation is not known.

While there are some symptoms which lead to an inferential diagnosis of the presence of pulp nodules, such as reflex neuralgia along the distribution of the fifth nerve, especially about the ear, or over the eye, sometimes fulgurating back to the tooth itself, excessive sensitiveness of the tooth to cold, and hypersensitivity of the dentin, the only positive diagnosis is to be made by the use of the X rays, or by the demonstration of their presence by actually finding them.

Owing to the mechanical obstruction of pulp nodules in the pulp chamber and canals, it is difficult to destroy such a pulp and to remove it successfully after it is destroyed. Circumstances may be such that it is best to extract the tooth in order to relieve the sufferings of a patient. As pulp nodules occur frequently in teeth not affected by caries, it may be necessary to drill from the surface to the pulp chamber before anything can be done toward alleviation of pain, which is not always possible unless done under a general anesthetic, which may not be advisable either.

On one occasion I was called into consultation with a physician at the bedside of a patient who was suffering from a neuralgia of obscure origin. I suspected the presence of pulp stones, and by means of the thermal test and percussion I traced the source of the neuralgia to a molar, extracted it, broke it open and found the nodules *in situ*. The patient was relieved at once of suffering which had extended over a long period.

If the pulp can be exposed, repeated applications of arsenic may be required to devitalize it, and after the canals are finally filled, such teeth may develop a persistent non-septic pericementitis from which they never recover.

DEEP CAVITIES INVOLVING THE PULP.

In cases of deep cavities, when the pulp is not actually exposed but when there is reason to believe that it is more or less involved, it often becomes a nice point in diagnosis to determine whether a filling may be safely placed over such a pulp, or whether it requires preliminary treatment, or whether or not it had best be destroyed. In deciding these questions, there are two important factors to be taken into account.

First. The history of the tooth, gathered from the patient by these questions, viz: Has this tooth ever ached? If so, what appeared to be the initial cause? Does it begin from contact with anything cold? Do sweets or acid-sweets (candy) cause it? Does it become painful when food becomes packed into it while eating? How long does it ache when started, and what was done to relieve it?

If the fact is brought out that the tooth only hurts a little while, when in contact with cold considerably below normal body temperature, such as ice-water or ice-cream, or is briefly painful to things sweet, and comfortable at other times, no serious lesion of the pulp need be apprehended. If, however, the tooth aches when food becomes crowded into the cavity in eating, and is only relieved when the food is picked out of it, it may mean either that the pulp is suppurating and voiding pus into the cavity, which being obstructed in its escape produces pressure and pain, or that it is putrescent, and the usual escape of gases is prevented; or it may indicate that the covering of the dentin over the organ is

so thin that the pressure of the food is conveyed to the pulp, which is very intolerant of pressure.

Second. If through these questions it is determined that as yet there is no serious disease of the pulp to be dealt with, the second item of importance is to determine the character or the condition of the dentin lying immediately over the pulp.

Now we know that, in the progress of dental caries, the lactic acid operates in advance of the bacteria that produce it, dissolving out the calcium salts of the dentin. The dentin so acted upon is said to be *affected.* When the germs have advanced into this decalcified area, the dentin is said to be *infected.*

In determining the best procedure in these deep cavities, it is quite important to distinguish between affected and infected dentin, and nice discrimination is called for to do it. The decision is made through the use of the senses of sight, touch, and hearing. With a broad-bladed spoon excavator, all soft carious matter is gently lifted away, until the dentin beneath feels harder than the matter just removed; it gives forth a different sound as the blade passes over it, and when viewed with a strong light the surface shows smooth, and not penetrated at some point by a depression filled with a softer material. Such a point is to be viewed with suspicion, for it is the end of the cone of decay which very probably penetrates to the pulp, and we have an exposure there. The dentin over the pulp will always be dark in color, but if firm, smooth, and unbroken by any of those penetrating points, it may be anticipated with considerable confidence that this layer, if properly protected, will become recalcified and the pulp be preserved in comfort. It is well in such cases to take the precaution to sterilize the dentin by sealing some mild antiseptic into the cavity for several days.

If in the removal of the carious matter the pulp is exposed, it may be presumed to have been infected to such an extent as to make the propriety of capping it doubtful. Completely decalcified dentin loaded with bacteria, lying for some time directly in contact with a pulp, will have reduced the vitality of that organ through the absorption of toxins to such an extent that, if it be capped, death will probably supervene in time.

The death of pulps occurring under cement fillings or floors in deep cavities, which has been attributed to the action of arsenic contained in the cement as an impurity, is much more likely to have been brought about, as has been pointed out by Dr. C. N. Johnson, by the leaving of disorganized dentin in contact with the pulp.

ACCIDENTAL EXPOSURE OF THE PULP.

When a healthy pulp is accidentally exposed in extending a cavity into sound dentin, conditions are very different from those that obtain when a pulp is invaded by caries. In the former case the point of exposure is usually very small, being indicated to the eye by a tiny red or pink spot or a drop of blood. If this spot be immediately touched with phenol, and covered with an antiseptic paste made by mixing thymolized calcium phosphate with Buckley's phenol compound, this to be covered with cement without pressure, the pulp will usually be none the worse.

An experienced operator knows instantly when he has touched the pulp in excavating a cavity, by the peculiar start the patient gives, which is different from

the usual manifestations of pain when sensitive dentin is being cut, and when an operator receives that electric message, he should at once stop and look for that little red spot and take care of it then and there.

PERSISTENT HYPERSENSITIVENESS.

It sometimes happens that, when a large metallic filling or a gold inlay has been placed in a deep cavity in a vital tooth, extreme sensitiveness to slight reductions in temperature supervenes after some time, and this persists in spite of such treatment as is possible under the circumstances, and grows continually worse until that side of the mouth is rendered practically useless. It is difficult to say sometimes just what the cause may be, for it remained comfortable for a year or perhaps longer after it was filled. The trouble may be due to an active hyperemia induced by some severe shock from contact of the filling with some very cold substance, or possibly is the final outcome of imperfect excavation of carious dentin over the pulp. At any rate, whatever the cause, the discomfort is so great that something must be done to relieve the condition.

Unless the patient be too young to make it advisable to destroy the pulp, the procedure to obtain the quickest relief is as follows: With a small sharp drill, a hole is made in the side of the tooth—generally a molar—near the neck at the point of nearest approach to the pulp. The dentin will be sensitive when the drill first enters, then for a little distance there will be no pain; then, as the pulp is approached, it begins to hurt again. The operator must stop at this point, before the pulp is penetrated. Some of Buckley's arsenical paste is mixed with wood creasote to make it more liquid, and, taking up the tiniest possible quantity on a bit of cotton, carried to the bottom of the drill hole and sealed with cement. There will be no pain superinduced by the arsenic, and in twenty-four hours the tooth will be no longer sensitive to cold. In a week's time or longer, if more convenient, the pulp chamber may be entered from the occlusal surface, the pulp removed, and the canals and both openings filled.

This means the loss of the pulp, it is true, but the relief and comfort that comes from being able again to use teeth that have long been out of commission is, as I know from personal experience, worth the sacrifice. Moreover, if destroying the pulp is postponed in the hope, generally vain, that it will return to normal condition, the continued irritation is apt to induce the formation of pulp nodules, which will complicate the management of the case when the pulp finally has to be destroyed.

A PLEA FOR THE PRESERVATION OF PULPS.

While it is plainly evident from what I have said in the foregoing pages, that there are frequent occasions, in dealing with diseased conditions of the dental pulp, when it is good practice to destroy and remove it, I want to enter an urgent plea for the preservation of that organ whenever there is a fair chance that it may be continued in health and comfort, and to record my conviction that there is too great a tendency, among an increasing number of dentists, to destroy pulps for trivial causes. This tendency shows a deplorable lack of appreciation of the real value to a tooth of its center of vitality—its pulp.

With a little more intimate knowl-

edge of the symptomatology of the pulp in its various states, and a little more patience and perseverance in treating them, many pulps could be preserved in comfort and usefulness which are now being thoughtlessly destroyed.

The destruction of the pulps of all teeth upon which a gold crown is to be placed, as has been advocated by many crown and bridge workers, is not necessary—I mean in all cases.

When a tooth is so shaped or is inclined in such a position that much cutting is required to fit a band to it properly, the patient may be saved considerable pain in its preparation, and the tooth will be more comfortable afterward, if the pulp be removed.

But there are many molars and bicuspids upon which shell crowns can be placed with but little preparation, and there is no reason for destroying their pulps just because a crown is to cover them.

The advent of the gold inlay has had the happy effect of reducing largely the number of abominable gold crowns used, and one of the reasons why the inlay has proved a positive blessing is that those who use inlays are generally willing to spare the dental pulps.

Discussion.

Dr. C. L. Hungerford, Kansas City, Mo. I imagine that every man who expects to impress his hearers with the advocacy of reforms, or to clear away a path that has been obstructed by disuse, or to break through a new path never trod before, must be an extremist. Now, I know of no reason why the chairman of this section should have called upon me to discuss this paper, save that I, in desperation over the absurd teachings of years ago, read a paper before this association at Niagara recommending the wholesale destruction of pulps. I have seen no reason to withdraw from that position, except that I am more careful about stubbing my toes. In the following I shall try to answer some few of the essayist's queries and remarks. With his final statement, that it is not necessary to destroy the pulp of a tooth when a gold crown is to be placed upon it, I agree. Neither is it necessary to destroy the pulp of any tooth for any cause except that the pulp is in the way of a permanently successful operation. My belief is that capped pulps live a miserable life, and eventually die. Dr. Tileston says the first evidence of the value of the dental pulp and the necessity for its preservation is the fact that, after its destruction, the tooth structure commences to disintegrate. I scarcely think the enamel commences to disintegrate. It has lost its formative membrane, but so long as it is kept moist, it does not crack; neither does the cementum, upon which the tooth depends for its vital connection with the system, degenerate, owing to its physiological contact with the body, but depends entirely upon the periosteum. One may take out all of the pulp and the physiological relationship of the tooth will remain just the same as it was before the pulp was destroyed. That is theoretically true, though there may be difficulties that we meet with in our practice, since we do not always accomplish the total extirpation attempted.

The essayist does not believe that caries is more readily established by the destruction of the pulp, but claims that, if it has been established, it runs a more riotous course. Caries is in no sense a disease—and I wish I could impress that on your minds—it is not a patho-

logical condition. It has nothing to do with the economy. It is true traumatism, as much as the cutting of the hair. It is a chemical process that is taking place, external to the economy, and disease is instituted only after the soft tissues are reached and pathogenic germs find their entrance through these channels. Therefore, I do not believe that chemical changes will occur more rapidly in a dead tooth than in a vital one, nor that it is the experience of the average practitioner that caries runs a more riotous course after the destruction of the pulp than before.

The essayist further states that recession of the gums occurs and the roots of the teeth become blackened, whereas the neighboring teeth with vital pulps stand in their pristine beauty. I grant that this is true, but it is because the dentin of the teeth has absorbed the dead organic matter of a pulp that had been capped, and has afterward died. If a healthy pulp is thoroughly extirpated, and the canals are filled perfectly, the tooth does not discolor nor do the gums recede, as I believe every one of you will agree. You have seen more cases of recession of the gums in vital than in dead canines, barring cases due to pyorrhea.

It is also stated in the essayist's paper that deposits of secondary dentin will bring relief in cases of slight irritation. In my opinion, wherever secondary dentin makes its appearance, except in the normal progress of old age, where the walls are built around toward a common center, it will be followed by pulp nodules, and be a constant source of irritation to the individual whose teeth are so affected. Such teeth will not return to health. Secondary dentin is always followed by irritation and subsequent death, as far as my experience goes.

It is, of course, proper to soothe sensitive teeth before attempting their devitalization, but inasmuch as we have rapid methods of devitalization, ten or fifteen minutes being generally sufficient for this operation, why wait over night and thus give the patient more or less discomfort when the operation can be done so readily and quickly, and practically painlessly, if it is to be done at all? I would like to enter a protest against the use of arsenic, which drug has not been used in my office for fifteen years. If we attempt to devitalize a pulp with arsenic, we merely get a cessation of sensitiveness to thermal changes in twenty-four hours; but if we expect to deaden the pulp so as to secure its removal without pain, the arsenic must remain in the cavity for three or four days or a week, and by that time it will be found that the cartilaginous matter of the dentin has absorbed so much of the arsenic that it has penetrated not only through that cartilaginous matrix, but has also gone into the cementum of the tooth and through that into the vital peridental membrane, and will be a source of constant irritation. If a pulp has been destroyed by arsenic or any other chemical, the tooth will not be in such a healthy condition as if the pulp has been removed by a clean surgical instrument. I would rather have my hand cut off by a surgeon's knife than have it eaten off by acid, or fire, or some extraneous disease.

The essayist speaks about pulp nodules forming about a common center from an unknown cause. Later on in his paper he says that continued irritation, due to thermal changes and the like, produces pulp nodules. I agree with his latter statement. I have examined a great many slides made by my-

self and others, and although the cause is not known I rather think that pulp nodules are due to the end-fibers of the odontoblastic layer of cells forming secondary dentin in the body of the pulp. The mere presence of nodules in the body of the pulp is just as inexplicable and irrational, we will say, as the formation of secondary dentin about the other terminals of the odontoblastic layer that find their way into the pulp.

I am not an authority on any of these subjects. I only speak of that which I have observed in practice. The essayist speaks of non-septic pericementitis, but I know of no form of irritation of the peridental membrane or any other membrane that is not infectious, except that due to traumatism; for, if a tooth be malleted, until the membrane is sore, it will get well in a day or two. If, in forcing a crown on a tooth, the membrane is bruised, it will get well; but a continuous, persistent irritation around its apical portion means septic matter forced through the apex.

I have never seen an exposed pulp that has been capped remain comfortable for long. The percentage of dead, pulpless teeth that have never been treated and which have given no trouble is no greater than that of the teeth that have been capped and have given no trouble.

It seems to me that the whole question of the pathology of so-called diseases of the dental pulp simmers down to this one point—the anatomical position of the pulp tissue in the body of the tooth. Therapeutists especially speak of treating the dental pulp in the same way as they would treat a local inflammation somewhere else in the body, where there is an unobstructed circulation, and where the phagocytes have a chance to destroy the pathogenic germs that may be present; but the more Nature attempts to make repairs in the confined space of the pulp chamber, the more certainly she brings about strangulation and death of the tissues she is trying to protect. Any irritation of a dental pulp, if sufficiently protracted, will surely be followed by the death of this organ, no matter whether it gives trouble or not.

I think a tooth with a vital pulp is preferable to a tooth with a dead pulp, because in a vital tooth there is no danger of an imperfectly removed pulp, or of an undiscovered root-canal, or of apical canal portions remaining unfilled, or of infection by a septic instrument. Therefore, I would prefer a vital tooth all the time; but when a pulp stands in the way of making a sightly operation and of doing what seems to be the best in regard to the proper fitting of a crown, then I believe it necessary in many cases to destroy the pulp. But when, by any means, I can get around the destruction of the pulp, I adopt those means.

Fifteen years ago, at Niagara, when I spoke so radically regarding pulp destruction, I stood practically alone; perhaps two members of this association stood with me. But the swinging pendulum is coming back, and the profession as a whole is coming nearer to my position every year. I can well remember when Dr. Allport of Chicago recommended taking a V-shaped slice out of the pulp tissue, and bringing the edges together with a suture. Today, I destroy the pulps of teeth when they stand in the way of my work, or when I think that this procedure will further the comfort and health of the patient.

I would make this urgent plea: If it be found necessary to destroy the pulps

of teeth, do not attempt to fill narrow, constricted canals. Never yet were these narrow tortuous canals well filled without proper instrumentation. Such canals must be enlarged so that proper access may be obtained. There are very few roots that are so small that the orifices of the canals cannot be enlarged with more or less flexible reamers in such a way that proper entrance can be effected for a gutta-percha point, and this can be carried to the apical portion of the root, thus filling the canal perfectly and preventing further trouble.

If we would give more attention to instrumentation and manual dexterity, the destruction of pulps, I believe, would not be followed by any of the objectionable features mentioned by the essayist. As stated by the essayist in the beginning of his paper, we are prone to take the easiest way, and the men who do not destroy the pulps of teeth, but resort to capping, are taking the easiest way: who—

> But skin and film the ulcerous place,
> Whilst rank corruption, mining all within,
> Infects unseen.

Dr. H. J. Goslee, Chicago. The proposition before us is plain, clean-cut: When can we save a pulp—what are the clinical manifestations that indicate the preservation of a pulp?

I believe that a pulp can be saved when it is covered with a thin wall of healthy, normal dentin, and when there is active hyperemia in it. Now, what is active hyperemia—what are its symptoms? When a pulp causes pain after application of a known irritant, and subsides without treatment, not to start again until the application of another known irritant, and the duration of pain is but a few moments, never five or ten minutes—that means active hyperemia. The line of demarcation between hyperemia of the pulp and active or passive inflammation, or pulpitis, is that, in the latter, the exudate has penetrated through the vessel wall into the vascular tissue. In hyperemia the pulp never coagulates; in inflammation it always does.

I believe that painful active hyperemia starts not only from the application of cold, as stated by the essayist, but also following the disturbing conditions of influenza. Every practitioner knows that following an epidemic of influenza, patients complain of pain of short duration, which subsides without treatment. In such cases the loss of vasomotor control of the system allowed the bloodvessel momentarily to contract and expand, causing the inrush of blood and increased pressure on the nerves confined in the bony, root-like encasement.

How can we determine by clinical symptoms what pulps can be preserved? First: A pulp covered by healthy normal dentin. Second: One in which pain lasts no longer than ten or twenty minutes upon the application of a known irritant, or starts at least once in twenty-four hours without the application of a known irritant, but subsides without treatment within five, ten, or twenty minutes. Such pulps are only partially disturbed and can return to normal and remain so through life, provided that the inflamed area is small in comparison with the size of the whole organ—in other words, if there is only a partial, non-septic inflammation.

What are the symptoms indicating that a pulp cannot be saved? When a patient presents with a history of partial or total non-septic pulpitis, the pulp is doomed to destruction sooner or later,

and it is the dentist's duty to remove it before it undergoes suppurating or putrefactive changes with a probability of apical involvement. In such cases the patients state that the tooth some time ago began to ache very badly, as in active hyperemia, and that, later on, the pain started once or twice daily without provocation by a known irritant, and usually in the evening, or after dinner, between seven and ten o'clock. If the case is one of nearly total pulpitis, the patient will state that he had to sit up during the night, the pain being very severe, and that sitting up gave some relief. This relief is due to the change in blood pressure. In such cases the pain starts without the application of any known irritant and lasts from one to three hours. It would be absurd to treat such a pulp in an attempt to save it, though its life could be prolonged for many months.

When a tooth is sore upon pressure, owing to a pulp disturbance at the end of the root, there is not necessarily an infection, because I can conceive of a condition of non-septic apical pericementitis. In such non-septic apical pericementitis in vital teeth, the patient will usually state that for more than three days he has had intermittent pain, first of considerable severity once or twice in twenty-four hours, and that the tooth then became sore on pressure. If, on the other hand, the pulp is infected, the tooth will be sore on pressure in from eight to thirty-two hours; therefore, from the rapidity, and from the absence of periods of rest from pain, we can conclude whether we have to deal with an infected or a non-infected condition. All pulps which are affected and in which relief is obtained by the application of cold, either are undergoing a degenerative change or will do so in the very near future.

A pulp can be relieved of pain by the application of cold, when no infection is present; when there is infection; or when the pulp has undergone putrefactive changes—but in all three cases it is important that the pulp chamber be opened, and so the rule holds good. All pulps that are covered with decalcified dentin, or have been exposed by dental caries, should be considered as infected pulps.

Sometimes, after filling a root-canal, the tooth becomes very sore, and the dentist fears that an alveolar abscess is developing.

Pathologists are now agreed as to determining whether soreness to pressure in a tooth is due to the root-canal filling, or to the remedies employed, or to instruments carried to the end of the root, or to bacterial infection. This agreement is based on the following clinical symptoms: If a root-canal is overfilled, or irritating remedies or broaches are carried into the periapical tissues, the tooth will begin to feel sore in from six to eight hours. This disturbance in the periapical tissue will reach its height within twenty-four hours, and will then gradually recede, unless a gutta-percha point has been forced through the apical foramen. If bacteria have been introduced, they will set up an alveolar abscess, of which the patient will be unaware for about twenty-four hours, and which will become very active in thirty-six or more hours.

With regard to arsenic, and other devitalizing agents: I always feel that if I have destroyed a pulp with a devitalizing agent I am in a better position to remove all pulp tissue than if I have

merely anesthetized the pulp. I should also emphasize that formalin should not be sealed in every pulp chamber. It is not meant for that purpose. The man who gave us tricresol and formalin did not tell us to practice root-filling with the use of a single remedy. Sometimes I find it useful when employed as a counter-irritant. Tricresol and formalin is especially valuable in conditions of putrescence, but it is not indicated in the early stages of infection of the pulp. Now, what is the difference between suppuration of the pulp and putrefaction of the pulp? Suppuration of the pulp is the production of pus at the expense of the life cells of the organ; putrefaction of the pulp is a further reduction of tissue that is already dead. Formalin cannot irritate a putrescent pulp, but it can control the putrescent process very positively. If vital tissue remains in a pulp chamber, tricresol and formalin should not be employed.

I believe that it is possible to have secondary dentin deposited on the walls of a root-canal, and have the pulp remain vital as long as the patient lives.

Dr. TILESTON (closing the discussion). I think Dr. Buckley, in choosing Dr. Hungerford to open the discussion, caught a live wire. He has added a good deal of zest to the discussion by taking issue with my paper.

He said the tissues of the tooth would not disintegrate. I did not use the word "disintegrate," but "degenerate."

Did you ever see a city pavement that was made of blocks of granite being repaired or replaced because the underlying support had given way and the blocks, while still uninjured themselves, had sunken down and become degenerated as a pavement? It is quite possible in this degeneration that follows the death of the pulp for the enamel to be very seriously injured, without being exactly *disintegrated.* It is affected by the gradual degeneration of the tooth which follows the death of the pulp. The tooth degenerates in a different way from that which is noticeable in a vital tooth degenerating through pyorrhea, for instance. A pulp which dies in a tooth and is not removed will of course cause the tooth to discolor. At the same time a tooth which dies, but in which the pulp has been removed before putrefactive changes have taken place, will have a different appearance upon close observation from a vital tooth. While it may not discolor in early years if properly cared for, it soon takes on an opacity and will eventually discolor, finally becoming almost a foreign body, which nature attempts to cast out.

Dr. Hungerford says that he does not believe that caries is a disease. I presume he would call it a condition. It is both, in my opinion, because we admit that the active cause of caries, as has been emphasized in Dr. Coolidge's essay on "The Etiology of Dental Caries," is associated with active germ life. If we do not look upon caries as a pathological condition, we must separate it entirely from living organisms, such as germs, as a causative factor.

The question of the vital resistance of teeth must not be lost sight of in considering the rapidity of the progress of caries. I said a tooth which is not vital, if attacked by caries, will follow a more riotous course than will be the case in a vital tooth. This is because, in a vital tooth, we have that resistance to the progress of caries known as vital resistance. A tooth with a vital pulp will

obstruct the progress of caries, in my opinion, more effectively than one which does not possess that vital resistance.

As to the question of secondary dentin acting as an irritant: In every carious tooth in which the progress of caries is toward the pulp, as it is in most instances, after a certain length of time the pulp will seek to protect itself by a deposit of secondary dentin. If what Dr. Hungerford says is true, viz, that secondary dentin is always an irritant and eventually is an obstructive agent destructive to that pulp, then in every tooth in which a carious cavity forms the pulp would eventually die, which we know is not the case. Secondary dentin is not an irritant, except when it occurs in an irregular deposit such as sometimes results from certain pathological conditions of the pulp, but which is not that kind of secondary dentin which occurs naturally as evidence of advancing age or from the effect of caries encroaching on the pulp.

In the use of arsenic, it was stated a few years ago, shortly after the beginning of the use of cocain in the process first known as "funking" the pulp, or the usual method of pressure anesthesia —and the statement was credited to Dr. B. Holly Smith—that the use of arsenic was malpractice. But that statement has since been modified, I think, even by Smith. One who has practiced dentistry for thirty years, using arsenic more or less continuously all that time without any unhappy result, I think is justified in saying that arsenic is not a dangerous drug to use in the devitalization of the pulp, if used properly. A very minute quantity of arsenic is required to devitalize a pulp—so small, indeed, that I believe some dentists do not conceive the minuteness of the quantity necessary for this purpose. I heard Dr. William C. Barrett make the statement once that he had a bottle in his office in which a quantity of arsenic in crystalline form had at one time been kept, the bottle being then practically empty, the inside of which was coated with the dust of arsenic which had been there for years, and when he wanted to devitalize a pulp he touched the moistened cotton to the inside of that bottle, and the minute quantity of arsenic which adhered to the cotton was sufficient for the purpose. If we take too much arsenic, or leave even a small quantity in the tooth too long, an unfortunate result will be produced. If used judiciously it will effect the purpose and not be injurious to the tooth.

As to the formation of pulp stones being attributed to the action of the odontoblasts, I think Dr. Hungerford has a wrong idea as to the function of those cells. Lying as a single, membrane-like layer on the surface of the pulp, the odontoblasts deposit calcic salts to form the dentin, but they have never been supposed to be responsible for the formation of pulp stones or nodules, which are accretions of calcific matter in masses, usually within the body of the pulp, and in no way connected with the odontoblastic cells. It is true that sometimes they are adherent to the inner wall of the pulp chamber, but their structure is such as to differentiate them from either primary or secondary dentin.

It happens, in some cases, where there is no possible way of accounting for any septic infection, that we have a soreness on percussion—an evidence of soreness at the apical end of the root. That happens when we force a gutta-percha point through the end of the root into that area, and it happens very frequently

after a perfectly aseptic removal of a pulp which had contained pulp stones. This tenderness to percussion may be due to one of several causes, apparently non-septic, because it never results in the breaking down of the tissue into pus.

As to capping of the pulp: If an exposed pulp be capped without pressure, and be perfectly protected against infection by bacteria, there is no reason why it should not retain its healthy condition. It has only been treated in the manner in which any surgeon would treat a fresh wound. I know from my own practice that pulps that have been capped retain their vitality for many years and remain normally sensitive to thermal changes.

The next order of business for Section III was the reading of a paper by Dr. EDGAR D. COOLIDGE, Chicago, Ill., entitled "The Etiology and Progress of Dental Caries," as follows:

The Etiology and Progress of Dental Caries.

By EDGAR D. COOLIDGE, D.D.S., Chicago, Ill.

IF it were possible to ask one who had lived during the period of the earliest records of civilization—about 3000 or 4000 B.C.—regarding the most accepted explanation of pain in a tooth, the reply would probably be that the one suffering had in some way offended the deity, and was doing penance for the offense. Such a brief and definite reply could not be given today for the cause of the most prevalent disease of mankind, known as dental caries. The passing years have seen many theories expounded, while scientific investigation has verified and contradicted, added to, and taken from these theories, through experiments, analyses, comparisons, and deductions. At this time a summary of the records of a vast amount of research work and of the opinions of scientific men shows that the trend of opinion seems to be drawing closer to an agreement that it is not an error of nature that such a disease is prevalent, but that nature has been interfered with by the progress of civilization along certain lines, and the remedy will probably be found in a return to more natural conditions, or by supplying such factors as are demanded by nature to prevent this disease.

THE PREVALENCE OF CARIES IN LIVING PRIMITIVE RACES, ACCORDING TO MUMMERY.

In the statistics compiled by J. R. Mummery in his investigation into the prevalence of caries in existing primitive races, the following classification is found. (1)

Race.	Percentage of skulls showing carious teeth.
Eskimos	1.4
Maoris	3.0
Indians, N. W. America Coast	3.9
Fiji Islanders	5.2
Northern Hindoos	5.9
North American Indians	9.5
Eastern Polynesians	11.4
Southern Hindoos	14.0
Zulus	14.2
Sandwich Islanders	19.0
Australians	20.5
Bushmen	20.6
Negros (slaves)	20.8

CARIES IN PREHISTORIC CRANIA (PATRICK).

The result of Patrick's[1] examination of prehistoric crania to be found in the various museums in America is as follows:

Race.	Number of teeth examined.	Percentage of carious teeth.
Asiatics (including Malays, Chinese, Japanese, Armenians, Hindoos, and Burmese	2,180	2.064
Egyptians and Africans	3,306	3.418
Polynesians and Australians	2,738	4.309
Central Americans	930	4.872
North Americans (including Eskimos)	27,362	5.093
South Americans (including Tierra del Fuegians and Guanches)	6,719	5.804
Europeans (including "a few modern soldiers")	3,422	7.079

CARIES AMONG MODERN SCHOOL CHILDREN.

Most of us are familiar with the results of the examinations of school children at the present time, and know what a large percentage of mouths with caries exists. In this country the average percentage is between 85 and 98 per cent. in which caries exists, and the same condition is found in all civilized countries where such examinations are being held.

COMPARATIVE STATISTICS.

The comparison of the first table of statistics made from skulls of adults of the primitive type, and those made from the mouths of modern school children, does not represent a true condition, and is not a fair comparison. However, in the case of the Maoris, an examination of the mouths of fifty school children, living under entirely European conditions, shows the presence of caries in 95 per cent. of mouths.[1] The Maoris have been under the influence of civilization less than one hundred years, and the habits of civilization have not been adopted until very recently.

Again, a summary of the statistics shows that—"The number of persons affected by dental caries who live under uncivilized or natural conditions is comparatively small, varying from 1 to 20.8 per cent., while in civilized modern races the proportion is as high as 98 per cent., the increase being at least 77.4 per cent.[1] It is not necessarily the progress of civilization which is responsible for such a change in the condition of the teeth, yet the habits of civilization, especially in regard to diet, are undoubtedly responsible to a very great degree.

HISTORICAL.

As early as 1530, the theory that the decomposition of food produces an acid which destroys tooth substance is recorded.[2] This was not a generally accepted theory at that time, for the records show that there were others, among which were the "worm" theory of the middle ages, and another theory of older times that it was due to a disturbance of the four principal humors of the body[1], both of which were accepted until quite recent times.

In 1835 Robertson[2] gave a description of caries similar to the one advanced in 1530, based on the chemical decomposition of food, and opposing the theory of some of the earlier writers in regard to dental gangrene—the inflammatory theory. This opinion was nearer to the present line of thought than any previous to that time, and much was de-

veloped along these channels in the years following. Underwood and Milles(2) began the work along the line of bacterial investigation, but Miller connected the two lines of thought and demonstrated the theory that prevails today in regard to the formation of acids and caries of dentin.

This theory has been called the "chemico-parasitic theory," the principal points of which are that there are acid-forming bacteria in the presence of carbohydrate food material, causing a fermentation of the carbohydrates, with lactic acid as a waste product of the process. The acid thus formed dissolves the calcium salts from the cement substance of the enamel, and the enamel rods fall apart. Both acid and bacteria enter the dentinal tubules, and the decomposition of the organic matrix follows.

Black has added to this the differentiation between caries of enamel and dentin.(2) The dentin does not change form histologically or physically at first, the organic matrix being of sufficient amount and consistence to remain after the solution of the calcium salts. The softened matrix "acts as a dialyzing membrane," passing calcium lactate—a soluble salt—from the tooth to the mouth, and sugars from fermented carbohydrates into the tooth to the growing micro-organisms. The micro-organisms penetrate the tubules, "growing like a grapevine(2) through a lattice," and spread laterally along the dento-enamel junction—"therefore the tendency is to the formation of a conical area of decay, with the point of the cone toward the pulp of the tooth and its base against the dento-enamel junction."

As micro-organisms develop, they crowd into the tubules, and there is an enlargement of the tubules to receive them. "The enlargement of the dentinal tubule continues until the division walls disappear, uniting two in one, three in one, and so on, until there is nothing left but a mass of micro-organisms mingled with some undissolved shreds of organic matrix, which, if the cavity is exposed to the saliva, wastes out and is washed away."(2)

ETIOLOGY.

In a general way dental caries may be considered as having first, an exciting cause, and second, a predisposing cause.(3)

EXCITING CAUSE.

The exciting cause is twofold: Acid-forming bacteria, active, and fermentable carbohydrates, passive. The mouth always contains the first, and the environment is such as to produce growth in almost all cases where the second element is present, providing these bacteria be undisturbed. With the growth of these bacteria, there is a product of metabolism formed which causes the destruction of the tooth substance by a solution of the calcium salts of the enamel. The diastatic enzyme—ptyalin—and the product of metabolism of bacteria in the presence of carbohydrates have the power of converting carbohydrates into lactic acid. Lactic acid is considered as the force which attacks the enamel, producing the beginning of decay. ("American System of Dentistry," vol. i, p. 805.)

Before considering the predisposing cause, let us recall the definition of that term. According to Gould, it is "that condition of the body in which causes that leave other persons unaffected call forth an attack of disease in individuals

predisposed. The term at the present time refers especially to susceptibility to infectious diseases, and implies a peculiar condition of the bodily juices or cells, in which these are unable to repel the invasion of pathogenic micro-organisms."

PREDISPOSING CAUSE.

There may be local and general predisposing causes. Local predisposing causes may be considered as those conditions of the surfaces of the teeth which lessen their resistance to the attack of the active force, and the environment of the teeth, which may be favorable to the action of bacteria upon carbohydrates to form lactic acid.

General predisposing causes are those influences of heredity and of bodily condition which lower the resistance of the teeth to attacks of bacterial action. Some hereditary influences may have their expression locally, as the inherited tendency to defective formation, irregularities of alignment, etc. The age and bodily condition with regard to systemic disorders influence the local environment of the teeth.

The study of the cause of caries involves two lines of investigation, one dealing with the active force that is ever present, and the other with the power or ability peculiar to the tooth and its environment to resist the attack of this force. Both these fields appear of equal importance in regard to the cause of caries and to the control of the disease. Whether the problem be solved by controlling the bacterial action, hastening the reduction of carbohydrates, or by increasing the resisting power of the teeth and their environment, matters little; the control of this condition is the goal sought for.

CARIES OF THE ENAMEL.

The beginning of dental caries must necessarily be on the enamel surface. The studies and investigations of Miller were mostly made along bacteriological lines, and upon caries of dentin. Williams came to the conclusion, after a long series of investigations, that human teeth are more perfect than those of animals, and he was opposed to the view that imperfections of structure had anything to do with decay. He agreed with the conclusions arrived at by Black from his investigation of enamel, which were: "Imperfection of the teeth, such as pits, fissures, rough or uneven surfaces, and bad forms of interproximal contact, are causes of caries *only in the sense of giving opportunity for the action of the causes that induce caries,*" and again, "These points are all insufficient to explain the facts clinically observed, or the wide variations that are presented in the disposition of caries to attack the teeth of different individuals." (*Dental Cosmos* 1895, p. 416, and 1897, p. 177.)

The conclusions drawn from the observations of Williams and Black in regard to the importance of the surface imperfections of enamel were very similar, in that such imperfections have little to do with the resisting power of the teeth. Williams summarizes his article in these words:

"If environing conditions of the teeth are such as to favor the development and activity of acid-producing bacteria, and if those bacteria are permitted to become attached to the surface of the enamel, it is doomed, although it may be the most perfect that was ever formed. On the other hand, if these environing conditions are not present, the worst enamel will not decay." (*Dental Cosmos* 1897, p. 374.)

The observations of Pickerill on the enamel have led him to the conclusion that the condition of the surface of the enamel is a very important factor in susceptibility to caries and in the resistance of the enamel to attacks of acid products. He lays a great deal of importance upon the difference in the surface of the enamel, having observed that the teeth in which the most decay is to be found have peculiar characteristics, which differ from the teeth in which very little decay is found. In classifying these characteristics, he terms the teeth free from decay as sclerotic, and those in which much decay is found as "malacotic," and the teeth of uncivilized races where very little decay is to be found, he terms "native teeth."(1) He shows how these types of teeth differ from each other in their surface analysis, and that the malacotic teeth are very much more uneven and rough than the other two types. This unevenness, which he terms "imbrication lines," he shows to be interdependent with the striæ of Retzius, and his opinion is that they are caused by "checks in the secretive function of the ameloblasts . . . . due to the pressure of the bony walls of the crypt in which the tooth is developing—*i.e.* the resultant of two forces of evolution: (1) Hereditary tendency of the ameloblasts to continue functioning to a certain definite extent. (2) Limiting force of environment, expressed as a diminution in the size of the jaws—*i.e.* the result of altered habits of diet, and also to some extent of natural selection." He also found that the different types of teeth vary in their resistance to the action of acids. Head has shown that a 1 in 20,000 solution of acid calcium phosphate would soften enamel more than the same acid of greater strength (*Dental Cosmos* 1907, p. 804), and also that a 1 in 1000 lactic acid solution will soften enamel more than a 1 in 500 solution, while even a 1 in 20,000 solution will soften enamel as much as a 1 in 500 solution. (*Dental Cosmos* 1910, p. 46.)

Pickerill found a greater significance in the action of acids of the same strength upon the different types of teeth. His conclusions on enamel investigation are—

(1) That the enamel of teeth varies appreciably as to surface structure, hardness, density, permeability, and solubility.

(2) That these variations are measurable, and in all cases bear a distinct relationship to the clinical classification of teeth into sclerotic and malacotic types.

(3) That this difference is not wholly developmental, but is *partly* acquired.

(4) The difference in surface structure is, of course, wholly developmental. A nearer approach to the "native" type, and therefore a more highly resistant enamel, is to be attained by a more physiological use of the jaws in very early infant life, this continuing especially during the time that the roots of the deciduous molars are developing, in order to stimulate both the growth of the jaws and the full development of the tooth germ and crypt.

(5) The difference in density and permeability are probably partly acquired, and are dependent on the osmosis of lime (calcium) salts from the saliva.

(6) Finally, in order to obtain enamel of the highest resistance to caries, it is necessary to promote those conditions, hygienic, dietetic, and prophylactic, which will insure—(*a*) The normal development of the enamel organ to its fullest extent, and (*b*) that the phosphates and other lime (calcium) salts shall remain in solution in the saliva for as long a time as possible. (Pickerill, p. 115.)

Some of these conclusions are in accordance with those of Miller, especially in regard to the resistance depending "to a certain extent upon the structure

of the tooth, upon the perfection of the external enamel crust, the enamel cuticle, and upon its freedom from fissures, bruises, cracks, or weak lines such as are produced by uncalcified prisms." (*Dental Cosmos* 1905, p. 39.)

PLAQUE FORMATION.

The existence of the gelatinoid plaque has been thoroughly demonstrated by Black, Williams, and Miller. There is no doubt as to its presence, nor that it is a factor of great importance affecting localization of caries. Increased activity and greater virulence of the micro-organisms protected by the plaque is found in almost all cases, and it would seem that in the control of such plaques might be found the correction of the disease.

Miller did not place as much importance upon plaque formation as did Black and Williams. He claimed that —"Caries occurs at points which cannot be kept free from accumulations of food, *i.e.* at points which are not kept mechanically cleansed. Films are likewise found under exactly the same conditions, and consequently films and caries must occur together, but we are hardly justified, by this fact, in making one of them dependent upon the other. If there is any interdependence at all, it is just as natural to suppose that the softening of the surface of the tooth produced by a beginning decalcification furnished a more ready opportunity for the attachment of the film." (*Dental Cosmos* 1902, p. 441.)

Black says regarding plaques: "It may be laid down as a principle that for caries to begin in the enamel of the teeth anywhere, the caries fungus, which forms an acid, must be attached to the surface of the enamel in some such way as to prevent the acid which it forms from being readily washed away and dissipated in the general fluids of the mouth." (Black, "Operative Dentistry," vol. i, p. 75.) Williams stated during his investigation that decay is the "result of some specific cause acting continuously at some particular point in a manner impossible to free acids in the mouth." (*Dental Cosmos* 1897, p. 294.) His conclusions were (as previously quoted) that "If those bacteria are permitted to become attached to the surface of the enamel, it is doomed, although it may be the most perfect that was ever formed." Yet plaques are found upon teeth immune to caries, as well as upon teeth where there is arrested caries. It is also possible to find them where there is no acid decalcification beneath the plaque. Kirk says this is explained by the fact that there are certain requisites necessary to produce acid decalcification, and if one of these is wanting, there will be no decay, although the plaque be present. He further states that plaque formations differ in character, and may be produced by bacteria other than those causing decay. Therefore he concludes: "As one of the important, and I believe the direct means of localization of the decay process in caries susceptibles, the precipitation of mucin by the secreted lactic acid appears to be a prominent factor." (*Dental Cosmos* 1910, p. 736.) Jones (*Dental Review* 1911, p. 1176) also has placed a great amount of emphasis upon the precipitation of mucin in plaque formation. The first action of the acid product of carbohydrates is to precipitate mucin, which forms upon the protected surface of the tooth, producing the film and furnishing protection to the bacteria. Pickerill does not consider the

plaque of any great importance in the cause of caries save as occurring under the same circumstances that favor lodgment of infectious and carbohydrate material. His conclusion from his study of the enamel surface is that microscopic pathological departures from the normal structure lessen the resistance and favor adhesion of foodstuffs and micro-organisms.(1) So it seems universally recognized that plaques are present with caries, but some difference of opinion still exists as to their importance as causative factors of caries, as well as to their structure and formation.

ENVIRONING CONDITIONS.

Most writers on caries seem to be agreed that caries is dependent upon the environment of the teeth. Black writes (*Dental Cosmos* 1895, p. 416): "Caries of the teeth is not dependent upon any condition of the tissues of the teeth, but on conditions of their environment." In another place he says: "The active cause of caries is a thing apart from the teeth themselves, acting upon them from without, and, from a consideration of the facts thus far developed, the logical inference is that the cause of the differences in the liability of individuals to caries of the teeth is something in the constitution, operating through the oral fluids and acting upon the active cause of caries, hindering or intensifying its effects." One of the significant features in this statement is that it shows that the same trend of reasoning was activating Dr. Black's mind then, as in his latest work published on "Salivary Calculus," regarding the importance of the saliva and its constituents in all pathological conditions about the teeth.

Miller and Williams both express themselves as believing in the importance of the environment of the teeth as a factor of dental caries. Kirk also writes on the conditions of the saliva as a causative factor of great importance in caries. In fact, almost every investigator has stated his belief in this direction, and with such a consensus of opinion it would seem that the goal is closer than ever before, when we can have such a knowledge of the cause of this condition that a control of it will be more easily effected.

THE SALIVA.

The most important factor of the environment of the teeth is the saliva. The teeth are bathed in this fluid of the secretive glands of the oral cavity constantly, and although there are many conflicting opinions regarding the effect which it has upon them, yet the general trend seems to indicate that a more thorough knowledge of its peculiarities will bring light upon many of the pathological conditions of the mouth. Black's final words of his paper on "Deposit of Salivary Calculus" were—"The examination of the saliva and other secretions, in conjunction with the urine, seems to be demanded." (*Dental Review* 1912, p. 350.)

The saliva is "extremely variable in its composition and amount, but these do not occur without reason," says Pickerill.(1) This seems to be in accordance with the opinion of many others who have studied this field. Kirk says: "It is because of this variability in the salivary composition that the importance of the saliva as an index of the general nutritional state of the individual has come to be recognized."(8)

Kirk also reasons that, on account of the sensitiveness of bacteria to alterations of the culture medium, any changes in the composition which are brought about by the state of the nutrition would necessarily influence the activity of bacterial growth in different mouths and in the mouth of any individual at different times.([8]) Reasoning from such an hypothesis, it would seem that, with a normal fluid present, capable of changes in its composition which hinder the growth of acid-forming bacteria, a knowledge of the conditions which cause these changes to occur and the ability to produce them at the proper time should aid materially in the control of the disease. This immediately suggests the question, What are the changes possible to be produced, and how may they be brought about?

In 1906, Low renewed the examination of the saliva for potassium sulfocyanate, and the same investigation was continued by Waugh. Their conclusions were that the absence of KCNS and the presence of dental caries was always noticeable—which led them to believe that the presence of KCNS had some protecting influence. Hugenschmidt (*Dental Cosmos,* October 1896) experimented to find the effect of KCNS in retarding the growth of bacteria, and found no effect. Miller also regarded the effect of KCNS as of very little importance. (*Dental Cosmos* 1903, p. 11.) The disagreement of these last-named investigators with the former seems to be justified when considering the result of their experiments. Bunting claims that the ferric chlorid test for KCNS as used by Low and Waugh is of little value, in that an ethereal solution of the dried saliva should be used, and that other substances beside KCNS may be found in the saliva which will give the same color test. One of these substances, he says, is diacetic acid.

Pickerill disagrees with Bunting on both of these points. In regard to the presence of diacetic acid, he says it is only found where pathological conditions exist, such as Bright's disease. This view is substantiated by other medical authorities. He does not consider the presence of KCNS of so great importance as some other elements. Pickerill has placed great importance upon the amount of saliva secreted per minute and the alkalinity per cc., using different foodstuffs and other stimuli to stimulate secretion. (See tables on pp. 136, 144, 151, 173 and 184 of Pickerill's work.) He has made extensive experiments, and his mucin deductions are very convincing of the importance of the secretion stimulated by natural means to keep the teeth bathed in a fluid intended by nature to protect the parts it washes. He reasons that higher civilization has brought about two conditions which favor a decreased salivary secretion; first, increased mental excitement, and second, decreased bodily exercise.([1]) He found that all acid foods, such as contain tartaric acid, have a very great stimulating effect upon both the amount and the alkalinity of the saliva. Such food as bread produces less than the normal amount of flow, and less than the normal amount of alkalinity per cc. and per minute, while such foods as oranges and apples would produce about seven times as much saliva as normal, and eight times the amount of alkalinity. Another impressive point is that, fifteen minutes after the cessation of stimulation with acid diet, both the amount of secretion and the alkalinity index are from two to three times the normal.

He also found that the food which produced this increase of flow and alkalinity also increased the amount of most of the elements to be found in normal saliva. Such elements as ptyalin, potassium sulfocyanate, phosphates and chlorids are shown to be increased in amount by acid diet, while mucin shows a decrease in amount. In mouths where a thick, viscid, or ropy saliva is found, caries is generally prevalent. Pickerill says this abundance of mucin "may possibly be regarded as an effort by nature to provide a material which, if precipitated, would undoubtedly protect painful surfaces against acid stimuli." Precipitated mucin will undergo an alkaline decomposition in the presence of saliva, when carbohydrates are not present, but the "organisms attack the carbohydrate in preference to the mucin, and an acid reaction develops, until the carbohydrate is all used up." He makes the following conclusion from his study and experiments with the saliva—"That in the saliva is provided a natural and potentially perfect mouth-wash, acting continuously day and night—not merely for a few minutes a day; that it is, moreover, completely under control; that it may be altered or varied in amount or composition; that its beneficial effects may be increased or decreased absolutely at will."(1)

FOODSTUFFS AND THEIR EFFECTS UPON SALIVA AS AN IMPORTANT FACTOR IN THE ETIOLOGY OF CARIES.

The active cause of decay, *i.e.* microorganisms and carbohydrates, can probably never be eliminated. If this is the case, it seems that the study of conditions that increase the resistance to the action of this cause is the most inviting at this time. If fermentation of carbohydrates is the source of the acid-producing decay, a study of foods would seem to have much importance in finding the cause of decay and the remedy as well. Hastening the fermentation to exhaust the supply of carbohydrates before the flow of an alkaline saliva might cease would have a protecting influence on the teeth. If all solutions or preparations for cleaning teeth were of a nature to stimulate the flow of saliva—and a saliva of increased alkalinity—does it not seem reasonable to believe that it would be a hindrance to the causes of decay?

The conclusions of Pickerill on the study of foods are—"That in order to prevent the retention of fermentable carbohydrates on and between the teeth, and so eliminate, or very considerably reduce the carbohydrate factor in the production of caries, starches and sugars should on no account ever be eaten alone, but should in all cases either be combined with a substance having a distinctly acid taste, or they should be followed by such substances as have been shown to have an alkaline potential; and the best of these are, undoubtedly, the natural organic acids found in fruits and vegetables."

This consideration of the importance of the diet is substantiated by Kirk, Black, and others. Kirk says (*Dental Cosmos* 1910, p. 736), "Finally, as the composition of the saliva upon which caries depends is a factor of nutrition dependent upon food habit, decay of the teeth is a diathetic expression, and the desired immunity to its ravages can be attained only through attention to more intelligent and rational dietetic hygiene." The views of Dr. Black, as expressed in his article on "Deposit of Salivary Cal-

culus" (*Dental Review* 1912, p. 336) show that he considers the control of deposits on the teeth possible by regulating the diet. There is doubtless some connection between the cause of deposits and the cause of decay.

In comparing the diet of civilized and uncivilized races, it is very noticeable that we have omitted much of the natural acid diet and many hard substances that are both stimulating and cleansing, and have substituted softer and more insipid articles or prepared foods that require little mastication and excite little flow of saliva.

SUMMARY.

(1) The active cause of caries is the presence of fermentable carbohydrates and acid-forming micro-organisms.

(2) The predisposing cause is a lowered resistance due to conditions brought about by changes of habits which have affected the development of the teeth and the condition of their environment, together with habits which do not aid, and often hinder, the process by which nature attempts to preserve or protect its creation.

(3) Plaques are an important factor in the localization of caries, but there is still some difference of opinion as to their importance as causative factors, as well as to their structure and formation.

(4) The condition of the saliva, which is controllable in regard to the presence or absence of certain elements which, if present in proper proportions, might have a protecting influence upon the surface of the teeth or a resistance to the action of bacteria, is an important factor.

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Discussion.

Dr. H. E. FRIESELL, Pittsburgh, Pa. Dr. Coolidge has presented us with an excellent paper upon a subject which is as old, as common, and as important as it is little understood. The paper covers the subject in a clear, terse manner, and presents the salient points of the varying theories of the most important investigators of dental caries in a way that merits our commendation.

In line with the declaration of the good Book that all men are sinners, and the findings of our statisticians that 98 per cent. of us have carious teeth, perhaps the ancients were not so far wrong in the conclusion that toothache was a penance laid upon us by an offended deity. Certainly the circumstantial evidence in the case is equally as strong as much that has been put forward in support of more recent and no less preposterous theories of caries, such as the worm, the electro-chemical, and the acid saliva theories, the softening and rehardening of enamel, and the variability of nutrition in a substance like enamel.

The speaker's conclusions in regard to dental caries, which are based upon pathological as well as clinical observations, are that caries is a constitutional disease, having dissolution of tooth structure as its most noticeable symptom. Like most diseases, dental caries has a predisposing and an exciting cause. Those familiar with the various writings upon the subject will probably conclude that the predisposing cause is as yet not well understood.

Lowered vitality, debility, overwork, sickness, worry, pregnancy, excessive mental excitement, long-continued nervous strain, overeating, or lack of proper physical exercise—any one of these is sufficient to produce such a disturbance in harmonious functioning as to weaken the individual's resistance to bacterial influence; and thus we have the predisposing cause of dental caries, as well as other diseases. A more general term that may be used to cover all these conditions is "faulty metabolism." The exciting cause of caries is, without doubt, lactic-acid-forming bacteria. This was first brought to our attention by the writings of Underwood and Milles, later demonstrated beyond cavil by the researches of Miller in caries of dentin, and subsequently substantiated and elaborated by the work of Black, Leon Williams, and others upon caries of enamel and the gelatinoid plaque.

That the presence of fermentable carbohydrates furnishes a ready food supply for these caries bacteria is true, but that their presence or the existence of physical defects in the tooth structure has any influence other than permitting a more rapid decalcification after decay has once begun, I question.

All of the conditions classed under exciting causes may be found in mouths in which caries has never existed, or in which it has long been inactive, but decalcification of tooth structure does not take place until some constitutional disturbance results in faulty metabolism, and then caries becomes active. The decalcification of tooth structure as a result of fermentation of carbohydrate material lying loosely in contact with tooth surfaces is of exceedingly infrequent occurrence; if it were not, few of us would have our teeth very long. The saliva penetrating through these loose masses of food dilutes and washes away the lactic and other acids before harm can be done to the enamel. That a general acidity of the saliva could be the cause of dental caries, is an untenable theory, as is conceded by all who are familiar with the clinical evidences of the beginnings and progress of caries.

The theory of the gelatinoid plaque as presented by Black and amply substantiated by Williams and others, is the only theory which presents any satisfactory solution of the well-marked tendency of caries to attack certain areas of tooth surface, and these only under conditions where the predisposing cause prevails. Not every mass of gelatinoid matter, or collection of food, or mucous material on a tooth surface is a gelatinoid plaque, but evidently these are frequently mistaken for one.

The essayist states that—"Plaques are found upon teeth immune to caries as well as upon teeth where there is arrested decay. It is also possible to find them where there is no acid decalcification beneath the plaque." As this statement does not appear in quotations in the copy of the paper that was furnished to me, I presume that it expresses the essayist's opinion. Such, however, has not been my experience.

Micro-organisms and carbohydrates will always be present in the mouth; they cannot be eliminated or largely controlled, but since they are harmless, unless the predisposing cause of caries, whatever it may be, asserts itself, our attention may well be concentrated on studying that predisposing cause or causes. We find micro-organisms and carbohydrates in every mouth, but until there is an *active predisposing cause,* we do not find the formation of *true gelatinoid plaques,* nor do we find caries beginning on enamel surfaces. There is evidently something in the saliva of mouths that are free from caries that prevents the formation of gelatinoid plaques, or else there is something lacking in the saliva of mouths where caries is active that permits this plaque formation.

Dr. Daniel H. Squire, Buffalo, N. Y. I wish to congratulate the essayist upon the thorough and painstaking manner in which he has presented this important subject in his paper, which denotes a great deal of hard work and thoughtful study. He gives to us a *résumé* of the etiology and progress of caries from the viewpoints of all the leading dental investigators. In reviewing this essay, the thought naturally arises that the final settlement of the exciting causes of caries must be determined by the several committees engaged in scientific research. Many of the predisposing causes, however, can be understood, and their influence upon the teeth lessened, by every dental practitioner. The high percentage of caries in the mouths of our school children is appalling, and furthermore is very significant. It shows a lack of determined effort upon the part of many dentists to do their full duty toward prohibiting the progress of this disease.

Dentistry, when practiced only from a clinical knowledge, is empirical, and reminds one of the examples in the old arithmetic which used to be worked with only the answer in view, utterly devoid of any reasoning power. Observation of the operative procedures upon the tooth tissue still shows a lack of judgment and skill. Heredity and environment play a most conspicuous part in the causation of dental caries. These two great forces may work either in harmony or opposition; their final influence upon the dental arches and surrounding parts is unknown. Much depends upon the strength of these two forces as to whether the inherited tendencies will be characteristic of the parent or modified by the environment.

It is a fundamental principle of physiology that the use of an organ determines its strength. Those who have visited the National Museum at Washington, and have had the opportunity of viewing the skulls especially of dental interest, are much impressed with the anatomic formations of the jaws of the natural or partially civilized races. The massive development of the body and rami of the mandible is very noticeable. The ridges and eminences for the attachment of muscles upon either jaw are strongly developed and supported by reinforced elevations of bone. The teeth are large, well formed, and firmly fixed in perfect alignment in well-developed dental arches, and practically free from caries.

Pickerill points out that, if we would have strong, well-developed organs of mastication, our children from infancy must be taught to use the jaws properly.

He also says that in the skulls of children of uncivilized races which he has examined the deciduous teeth showed marked signs of abrasion, and were free from caries and malocclusion. This leads us to believe that these children did not bolt their food nor live upon a soft diet, but, on the contrary, that their food was coarse, fibrous, and well masticated. It is a well-known fact that the orthodontist depends upon mechanical stimuli to increase the development of a part. This force is probably not greater than that of the resistance of coarse foods upon the occlusal surfaces of the teeth during mastication, and, while it is not constant, it may be what is needed for a strong development of these parts. It is further claimed that there is a distinct relationship between the frequency of caries and the advance of civilization. It is known that the prevalence of caries fell in England after the invasion by the Anglo-Saxons, who were less civilized than the Romanized Britons whom they displaced. The experiments made by Dr. Black in regard to the strength of the bite show conclusively that the force of attrition has been greatly impaired by atrophy of the parts involved, this being due to a lack of proper exercise. This condition, when coupled with advanced caries, makes thorough mastication of fibrous foods impossible, and of even a diet of soft materials superficial, and this is the condition that many of our school children present today. The change from a diet of soft to one of coarse nature must be gradual. Sex influences the amount of caries, which predominates by from 3 to 25 per cent. in the female as compared with the male. We know that between the ages of six and twelve years caries is most rapid, and that the jaws fail to develop to their normal size. There are periods of immunity from caries, but they usually occur after adult life has been reached.

In the report of the United States army, the fact was brought out that the upper teeth were much less resistant to caries than the lower ones; it also showed a marked susceptibility of the different types of teeth to become affected in the following order: First permanent molars, second permanent molars, upper central incisors, bicuspids, third molars, upper canines, lower incisors, and lower canines. Age and position, therefore, have a decided influence upon the progress of this disease.

Caries upon the approximal surfaces of the deciduous teeth has a direct influence upon the permanent teeth, and, as it progresses, there is a dropping together of the teeth mesio-distally; this space, which the contour of these crowns maintained originally, is lost, and the erupting teeth take abnormal positions, because the jaws do not develop to accommodate them. Any narrowing of the palate in the molar region will cause a bunching of the teeth in the anterior part of the mouth, which prevents easy cleansing.

From a study of these predisposing causes upon the inception of caries as set forth in the paper, it is apparent that, aside from determining the exciting cause of caries, there is a twofold duty to be performed by every practitioner of dentistry, namely, educational and intelligent service, one being as necessary as the other. The permanence of tooth restorations is of short duration if the patient is not instructed in the importance of home prophylaxis. In order to interest the parents vitally in the care and treatment of their teeth and those

of their children, it is important to acquaint them with the relationship which a healthy oral cavity bears to the maintenance of a normal bodily function. The home care of the teeth must be systematically performed, and the results criticized freely by the dentist. The writer realizes that it is an unpleasant duty to tell a patient that his mouth is in an unclean condition, but, if it is not done, the dentist will some day be charged with neglect of duty, and will suffer the loss of the patient.

Understanding the laws of hygiene, the susceptibility to, and the conditions under which tooth tissues decay, the influence of heredity, environment, sex, and age, it is inconceivable how one can lay aside this knowledge and perform operations which show an utter disregard for all these factors. In our endeavor to solve the problems which are still hidden from us it is the opinion of the writer that we are losing interest in those things which we do know and understand. The fact still remains that we are not working in the light which we already have at hand.

Dr. Coolidge (closing the discussion). I have very little to say in closing —only to thank those who took part in the discussion for their kind words, and to thank the audience for their kind reception of the paper.

I wish to say, regarding Dr. Friesell's remarks upon a paragraph from my paper: That is not a quotation, neither is it entirely an observation of my own. He will find it in Kirk's article in the *Dental Cosmos* for July 1912, as well as in Pickerill's book. I may also direct him to the photomicrographs in Williams' and Miller's articles published in 1902 and 1907 respectively, where the conditions that I spoke of are illustrated.

Section III then adjourned.

THE CLINICS.

Report of the Chairman of the Clinic Committee.

By Dr. J. V. Conzett, Dubuque, Iowa.

The clinical program for the convention of 1913 was an experiment in some respects, but proved to be all that the friends of the experiment hoped for. In point of attendance and educational value we believe that its success was unqualified, so much so that the chairman has decided to arrange for a clinic of the same sort for the meeting at Rochester —in which, however, he will attempt to enlarge and refine the methods used, and make certain changes which experience has shown to be wise.

The clinics were divided into two sections of one-half day each, the morning clinic being a progressive one, following out the plan devised by Dr. Weston A. Price and used with great success at the Ohio State meeting, and after that at other meetings. The plan was to divide the convention into three sections of ten groups each and to have a clinician for each group. Every group thus had a clinician to watch for a period of fifteen minutes, after which time, at a given signal, each group moved on to the next clinic and a new group took the place of the old at each post. In this way every participant in the convention had the opportunity of seeing each clinic to the best advantage, and every clinician had the opportunity of reaching every participant in the convention with his special message.

In the afternoon a general clinic was held, which was divided into ten sections, each section under the chairmanship of a member of the clinic committee. These sections were classified into the different specialties of dentistry; for example, there was a section on gold fillings, one on inlays, one on orthodontia, etc., covering the ten phases of professional activity. This plan made it possible for the man who wanted to study the methods of some one phase of dentistry to go to that section and find grouped together in one place all that the convention offered on that subject; or, if a man wanted to see something of all phases of dental professional activity, he was enabled to go from group to group at his pleasure. Thus, with both plans in operation, it was possible to satisfy all classes of seekers after truth.

The chairman desires to thank the members of his committee who worked so faithfully and made the success of the clinic possible. He also wishes to express his sense of great obligation to the local committee men under the chairmanship of Dr. C. C. Allen, whose untiring efforts and intelligent planning made possible the carrying-out of the

plans which the clinic committee put into operation at the convention.

Respectfully submitted,

J. V. CONZETT, *Chairman.*

Orthodontia.

ORTHODONTIA. (By Dr. M. F. FINLEY, Washington, D. C.)

Dr. Finley demonstrated the use of the Jackson system in rotating upper central incisors, bands being cemented to the teeth with vertical tubes, using the double U or staple, which is removable; also the moving of a single tooth by means of finger-springs attached to the basic appliance.

The clinician also showed again the case presented at the Denver meeting, in which there was absence of all the bicuspids and no germs for the second and third molars, leaving the patient with a permanent denture of sixteen teeth and four deciduous molars.

Models were also shown with appliances attached for spreading the upper arch in a case of distal occlusion in a patient of ten years of age, which resulted in relieving the condition of contracted nasal space and constant tendency to nasal catarrhal colds.

ADJUSTMENT OF THE BRADY APPLIANCES. (By Dr. T. G. DUCKWORTH, Kansas City, Mo.)

The Brady appliances consist of the expansion arch and the contoured clamp molar band, the clamping device of which is on the buccal side. In the adjustment of the molar bands, very little contouring is to be done, and a perfect adaptation can be secured. The arch is bent to conform to the teeth on the models. The molar bands are then placed upon the arch and placed in the mouth, the arch being the means of securing the alinement. There need be no previous separation of the teeth, as the bands will slip in between the contact points, providing the proper adjustment is made. The clamping device on the buccal side of the molar band is to be recommended, as it is so protected by a sheath that it is not irritating to the cheek, and attachments can be made upon the lingual side. The arch and bands are placed on the teeth at one time, but allowed to remain passive for a few days, before any attempt is made to apply force.

AN APPLIANCE FOR MOVING THE ROOTS OF TEETH. (By Dr. HORACE L. HOWE, Boston, Mass.

Fig. 1 shows the appliance in position. It consists of the regular 18-gage expansion arch of platinized gold, to which are soldered vertical uprights of 21-gage platinized gold wire. At the extremities of the uprights open loops are formed so as to present a non-irritating surface to the lips, also to allow of easy application of ligatures which are tied around the teeth near the gums.

FIG. 1.

Before tying, the uprights should be so bent that the extremities stand away from the necks of the teeth, toward which the uprights should be sprung in tying.

It is sometimes advantageous to band the teeth to be moved, in order to prevent the ligatures from slipping.

The spring of the uprights, together with the torsion of the arch wire, affords a gentle stimulating force which produces truly wonderful action in making slanting teeth perpendicular.

Fig. 2.

Fig. 2 shows the case before treatment. In ten months, the change shown in Fig. 1 was brought about.

This appliance is very easily adjusted and at the same time positive in its action.

Orthodontia and Orthopedia of the Face. (By Dr. V. H. Jackson, New York, N. Y.)

Dr. Jackson presented forty models and appliances, and a box and model device showing a plan for equalizing the dental arches, also illustrating his method of designing and making his removable regulating apparatus, which is readily removed by the patient for cleansing both the teeth and the appliances. The clinician showed how an apparatus can easily be arranged for the correction of any form of irregularity of the teeth, and described (1) his method of anchoring appliances to the teeth by spring clasp attachments, and (2) his new method of anchoring appliances to the teeth by a locking device.

With the locking device, the appliance is anchored to a canine or bicuspid and to a distal molar on each side of the arch.

The locking device or anchorage portion of the appliance consists in cementing a collar with a buccal lug to each of the anchorage teeth, the lug being of triangular shape, like a door-latch. To the mesio- and disto-lingual portions of the appliance are attached wire clasps, shaped to pass over the arch at the junction of two of the teeth, and rest over the buccal lug or latch of the collar on each of the anchorage teeth described. The end of the wire clasp always terminates in a loop, similar to a small hook, so that, in unlocking the device, the operator's finger is not pricked or injured by the pressure in springing outward the end of the wire clasp. Moreover, the hooks of the wire clasps are always ready for the attachment of equalizing rubber bands when necessary.

The anchorage is suitable for supporting appliances for the treatment of any form of irregularity of the teeth, especially for equalizing the upper and lower dental arches in correcting prognathism of the mandible and protrusion of the upper arch for rotation of any of the teeth, for retention of the teeth, or for their movement in the process by the use of "equalizing posts."

The apparatus is adapted for treatment of patients of any age, as in moving the teeth of a young child or of an adult.

With the collection were shown models of the upper and lower dental arches of children four years of age, before and

after regulating. One case had upper protrusion and narrow arches. Together with the models a record card was shown for assuring definite changes at each visit, and an upper and lower appliance used for correcting the irregularity by the expansion of the dental arches, the arches being equalized by the use of equalizing rubber bands.

The clinician demonstrated the tracing and record-card system that he had introduced to insure the operator in making a definite measurement of each change made in the apparatus in applying a given amount of force and a definite amount of movement of the teeth, thus preventing any discomfort to the patient. Each change in this apparatus is controlled by measurement, or every step is recorded on the permanent record card.

Dr. Jackson again explained that. by using the record card in the manner shown orthodontia is reduced to an exact science.

Oral Prophylaxis and Pyorrhea Alveolaris.

ORAL PROPHYLAXIS IN THE TREATMENT OF INTERSTITIAL GINGIVITIS. (By Dr. CHARLES P. WOOD, Detroit, Mich.)

Dr. Wood treated a case of pericemental abscess with the Carr set of planes. At first the case was thought to be an ordinary alveolar abscess from a devitalized tooth, but, upon drilling sufficiently to make sure that the tooth had a vital pulp, further examination disclosed a pocket beginning at the lingual border and extending laterally to the labial surface near the apex, and ending in the fistula. The clinician removed considerable black scale and planed the root surface until it was smooth, and predicted that there would be no recurrence of the abscess. Dr. Wood believes that pyorrhea can be and is cured permanently every day by many operators by local instrumentation, when proper care is given to the mouth and the root surfaces after treatment.

CASES TREATED FOR PYORRHEA. (By Dr. J. D. PATTERSON, Kansas City, Mo.)

The patient, Mr. B., applied for treatment in 1904 with the following conditions: The teeth were free from caries, and were all seriously affected with pyorrhea. The lower left teeth were so loose that they could be removed without forceps, and the process had been partially sequestered; the jaw was badly swollen. First, all of the lower left teeth were removed, together with large amounts of necrosed process. Subsequently the swelling, pus production, and infiltration became so great that an opening was made outside, and after several months, during which time the remaining portions of the alveolar process were removed and the bone was deeply curetted, healing finally resulted, with much facial deformity. This deformity was corrected with a removable appliance attached to the remaining teeth, which made a complete recovery under treatment, and have remained sound. .

This clinic was given to demonstrate that necrosis is sometimes caused by pyorrhea alone, when the teeth are sound and vital; also to show a perfect recovery of health in the remaining teeth which were loose and on the verge of being in hopeless condition. It showed also a perfect restoration of masticating surfaces and of facial contour by the artificial jaw, which is worn with perfect

comfort. The opening necessary for the evacuation of the pus on the outside was made under the jaw, and the scar is thus concealed.

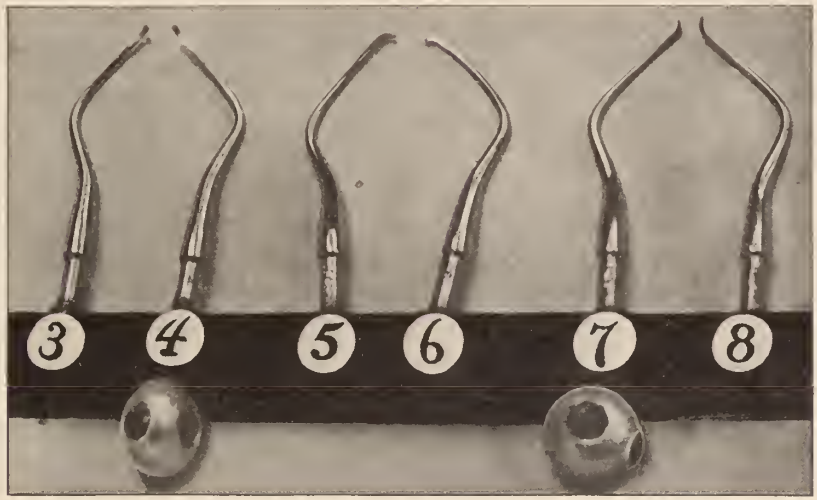
TECHNIQUE OF INSTRUMENTATION IN THE SURGICAL TREATMENT OF RIGGS' DISEASE. SCALING ROOTS AND BIFURCATIONS BETWEEN MOLAR ROOTS. REMOVAL OF CARIOUS BONE FROM SOCKETS. (By Dr. J. J. SARRAZIN, New Orleans, La.)

Calcarious or exposed deposits are to be removed by any heavy scalers with which the operator will do thorough work on root necks or visible parts of roots.

Root-scaling beyond the gum lines, with the exception of upper anterior roots, can be universally done by the original instruments, Nos. 3 and 4, as illustrated in the series. Besides giving complete peripheral axial access on roots, instruments Nos. 3 and 4 effectively scale into buccal bifurcations between upper molar roots, and also into lingual and buccal bifurcations between lower molar roots.

Distal bifurcations between upper molar roots are best scaled by Nos. 5 and 6 being used in addition, while the same two instruments give most gratifying access lingually of long or reclining lower incisors, reaching deeply on their roots. They give great help distally of lower molars also.

In upper second bicuspids instruments Nos. 7 and 8 are needed to scale properly into the mesial bifurcation between upper molar roots, using them in addition to Nos. 3 and 4. They are used mesially of lower molars also.



Aluminum finger-rest knobs are placed on the handles of the instrument points here illustrated—and as mentioned on page 300 of the 1912 Transactions of the National Dental Association: they allow of sterilization by heat, and give the necessary power to the points and side blades of the instruments by their being brought very nearly within the circumference of the knobs, which also increase accuracy of touch by extending the surface of contact with spatulated nerve fibrils on which the tactile sense

at the tips of fingers depends. Perishable knobs have heretofore been used.

Small round burs, Nos. 1 and 2, made twenty-one sixteenths of an inch long over all, and run in an adjustable angle handpiece, are used to remove carious bone from sockets. They can be placed at any angle desired, and their length allows unlimited access for the purpose, even in distant places between and around molar roots, both above and below. Round burs in a straight handpiece can be used to advantage for the same purpose only around the roots of upper anterior teeth. Angle burs of usual length lack reach.

(A) Temporary Retention of Loose Teeth. (B) Concealed Retaining Splint. (By Dr. Chas. A. Priest, Marion, Ind.)

(A) A ligature wire is placed loosely around all teeth to be retained, and pressed slightly into the interproximal spaces, both on the lingual and labial sides of the teeth. Then, with short pieces of the ligature wire, the labial and lingual wires are bound together between the teeth, twisting the short binding wires until they are tight. This will hold the teeth much more securely than if the wire is woven in and out between the teeth.

(B) This is made by making post inlays to fit cavities cut on the lingual side of teeth. The inlays are soldered together, and set as one piece.

Ammonium Fluorid Treatment for Pyorrhea. (By Dr. L. P. Davis, Lincoln, Nebr.)

It is only recently that anything other than instrumentation has been used for the removal of calcarious deposits from the teeth. Numerous medicinal agents were tried from time to time, but their use was discontinued owing to their injurious action upon the enamel and gum tissue. Most of the tartar solvents that were used contained either hydrochloric or sulfuric acid in such proportions as were absolutely injurious to tooth structure, and after a careful observation of their action they were discarded. Where tartar scales are confined to the roots of teeth alone, instrumentation will remove them, but this is always accompanied by much pain and hemorrhage.

It has been proved that tartar becomes more or less embedded in the gum tissue, and no amount of instrumentation will remove it without real damage to the soft tissues. Ammonium fluorid has been found not only to be a very sufficient cleaning agent and stain-remover for the teeth, but a most effective remedy for the treatment of pyorrhea, especially in severe cases where large quantities of pus surround the teeth, and pockets are deep-seated and inflamed.

In using this agent in such cases, the first step consists in as much instrumentation as possible. This treatment is followed by filling the pockets of the infected teeth with the agent and syringing each pocket out thoroughly, by extending the needle well into the pus pockets. The patient may then rinse the mouth with water, this rinsing to be followed by an alkaline mouth-wash, such as milk of magnesia.

The patient should return in four or five days for another treatment. It will be found at this time that the deposits remaining on the teeth are much more easily removed than at the time of the first treatment, that the gums look more firm and healthy, and that the amount of pus is greatly diminished. The second

treatment should be administered in the same way as the first.

It will only be necessary to treat such cases three or four times, when the pus will have disappeared and the gums returned to a normal condition. Teeth that are loose and very sore will be tightened by the use of this agent, and the soreness will disappear.

The medicament is used full strength as it comes in the vial. No hesitation should be felt in syringing each pocket or infected area thoroughly, as this drug has no harmful effect on the hard or soft tissues of the mouth, especially when followed by an alkaline mouth-wash.

Early Recognition and Prevention of Pericemental Diseases, and the Blood-clot Method of Curing the Pyorrheal Stages. (By Dr. T. Sydney Smith, Palo Alto, Cal.)

The clinician called attention to the fact that, since a large percentage of systemic diseases have their origin in the oral cavity, we should no longer confine our attentions to the repair of the teeth. We should recognize the necessity of that which is of still greater importance, viz, the preservation of the health of the structures supporting the teeth. This special care of the gums becomes more imperative since the treatment which is necessary for maintaining their health will also prevent nearly all of the destruction of the crowns.

It was pointed out that the special form which nature gave to the supporting structure of the teeth is extremely necessary to permit them to perform their function, that this need does not lessen with age, and that any change in form after the teeth are fully matured must be regarded as the result of pathological conditions.

It was also pointed out that we cannot sterilize the mouth by the use of medicinal agents. These merely inhibit nature's own protective forces. We can, however, make the mouth unfavorable for the development of micro-organisms by producing and maintaining a high polish on the surface of the enamel, especially on the approximal sides and underneath the free margin of the gingivæ. We can also make the gums extremely resistant by applying the sort of stimulation which nature intended them to receive, that is, by brushing them with a stroke which comes chiefly from the direction of the crowns.

We must be trained to detect even the faintest change in either the color or form of the gingivæ and immediately remove the cause from the gingival sulcus.

If pyorrheal pockets are present, they should be cured by inducing a vital reattachment of the separated tissues. The reattachment of the gums to vital teeth can be secured by employing the same general principles of surgery which we regard as necessary to permit a healing to take place in other parts of the body. This certainly forbids the introduction of acids and germicides or even of flour of pumice into the wound. All of the tissues, including the blood, must be permitted to take part in the healing. It may therefore be called the blood-clot method, not because there is more hemorrhage, but because the blood is not destroyed. We should always keep the wound as small as possible, for small wounds are certainly more easily healed.

This method of healing has the advantage of being rapid. It prevents as well any further recession of the gingival tissues while the cure is being effected.

INSTRUCTIONS FOR ORAL PROPHYLAXIS AND PYORRHEA PATIENTS. (By Dr. GRACE ROGERS SPALDING, Detroit, Mich.)

EQUIPMENT.

Brushes. Shape: Must be selected by the dentist to meet individual needs. Bristles: Medium quality. Number: Patient must have enough brushes so that each one will be used but once each day.

Dental floss: Flat ribbon floss; must be wide enough to be useful in removing bacterial plaques as well as food particles.

Tooth-powder: Adapted to meet the needs of the patient. Must be recommended by the dentist, who knows the contents of the powder, and, from experience, the action of the various ingredients.

Mouth-wash: Also prescribed by the dentist to suit the needs of the case only when he knows the contents and the action of the ingredients.

Toothpicks: Alpine wood or orange-wood. Useful in a few cases, but patients must understand their use.

Tongue-scraper: One that can be sterilized.

Mirrors: Two are necessary—one a mouth-mirror with which the patient can examine his mouth, the other to be hung in the bathroom over the wash-stand.

Instrument for *gum massage.*

PROPHYLAXIS PATIENTS: CHILDREN.

From 2 to 5 years. Brushes: 1 and 2 rows of bristles. Floss: Small size, to be used where teeth are in contact. Abrasive: Paste and powder mixed. Mouth-wash: Alkaline antiseptic, mild.

From 5 to 12 years. Brushes: 2 and 3 rows of bristles and circular brush. Floss: Use of floss is important. Abrasive: Powder, rather coarse. Mouth-wash: Astringent. Tongue-scraper.

From 12 to 18 years. Brushes: 3 and 4 rows of bristles and circular brush. Floss: Flat ribbon floss, width *R.* Abrasive: Tooth-powder. Mouth-wash: Alkaline. Tongue-scraper.

Unusual mouth conditions; orthodontia cases. Brushes: To the brushes of the usual class add a circular brush for the first and second molars (permanent), also a baby brush with a single row of bristles. Toothpicks: Flat and smooth. Floss: Use where possible, usually between incisors. Tooth-powder: Coarse. Mouth-wash: Astringent.

ADULTS.

Normal mouth conditions. Brushes: Selection as to size varies with length of crowns and size of mouth. Floss: Ribbon floss *R.* In rare instances *T.* Abrasive: Tooth-powder. Mouth-wash: Alkaline. Tongue-scraper.

Exceptions; gums receded and teeth missing. Brushes: Where gums have receded, to the supply of brushes a brush of one row of bristles is added to care for exposed root surfaces. Floss: Unwaxed *R* is best to use on approximal and distal surfaces of teeth facing a space or where there has been much recession. Abrasive: Tooth-powder of fine grit to insure against wearing the exposed root surface. Mouth-wash: Astringent. Tongue-scraper. Instrument for gum massage.

Missing teeth replaced by artificial appliances, fixed bridges, etc. Brushes: Specially shaped for bridges. Tooth-powder: Heavy. Floss: Use in a carrier between appliance and gum. Mouth-wash: Astringent. Tongue-scraper. Instrument for gum massage.

GENERAL RULES FOR THE CARE OF THE MOUTH.

How often shall I brush my teeth? As many times as you partake of food, and whenever possible within an hour after eating.

How shall I brush them? Never crosswise. Either use circular or vertical motions in brushing; if the latter, downward on upper teeth, upward on lower teeth.

What kind of a brush shall I use? Use at least two shapes of brushes, these to be selected by your dentist to meet your individual needs.

What kind of powder is best? A powder which will not wear the tooth surface, but which will be sufficiently abrasive to remove mucous coatings and bacterial plaques. This should be prescribed by your dentist.

When shall I use dental floss? This is just as important as the tooth-brush and should be used as often. It must be intelligently used or will prove very destructive. Your dentist must instruct you in the use of the dental floss.

How often shall I use a mouth-wash? A mouth-wash is of little value compared with the tooth-brush and dental floss, but is an aid in maintaining a wholesome condition of the mouth and throat. Rinse the mouth and gargle the throat before breakfast in the morning and just before retiring at night, with an alkaline antiseptic.

Is a tongue-scraper necessary? Before breakfast in the morning use a tongue-scraper before a mirror, and you will see the need of its daily use.

Do I need to massage my gums? If your gums have receded or the circulation is sluggish.

What other suggestions can you give me? None without seeing your mouth. Each case requires special instruction.

Anesthesia and Analgesia.

NITROUS OXID AND OXYGEN ANALGESIA. (By Dr. G. N. WASSER, Cleveland, Ohio.)

Dr. Wasser administered nitrous oxid and oxygen to fifteen different dentists, inducing satisfactory analgesia in each case.

INSTRUCTION IN SOMNOFORM ANALGESIA INDUCTION. (By Dr. W. H. DEFORD, Des Moines, Ia.)

This clinic consisted in practical instruction in the induction of analgesia by somnoform. Many dentists availed themselves of this opportunity to inhale somnoform to the stage of analgesia, thus acquainting themselves with the symptoms and state of the patient when analgesia is induced for various painful conditions in everyday practice. The methods of induction were dwelt upon and explained, the clinician using for this purpose the appliance known as the DeFord inhaler.

NITROUS OXID AND OXYGEN ANALGESIA AND ANESTHESIA. (By Dr. J. STEWART JACKSON, Denver, Colo.)

The clinician administered nitrous oxid and oxygen to five patients, with very satisfactory results. He removed six roots in a woman, demonstrating the use of the elevator, the patient remaining in the analgesic stage during the operation without discomfort, the sensory nerves only being acted upon. The clinician also anesthetized a man of sixty-five years and removed fourteen roots, keeping the patient in an even anesthetic stage during the entire time.

He also used oxygen to revive the patients or to drive the nitrous oxygen out of the system. No discomfort or after-effect was observed in any of the cases.

NITROUS OXID AND OXYGEN ANESTHESIA AND ANALGESIA. (By Dr. W. C. TETER, Cleveland, Ohio.)

This clinic consisted in the administration of nitrous oxid and oxygen for the extracting of teeth. In each of the ten cases treated the patient was anesthetized by the nasal administration of nitrous oxid and oxygen. After anesthesia was induced, sterile gauze sponges were placed in the back of the mouth for three reasons: First, to prevent mouth-breathing; second, to absorb the blood and keep it from flowing down the throat, and third, to prevent the possible chance of a tooth or fragment thereof getting into the throat.

The extracting was carefully done, causing as little injury as possible to the soft tissues of the mouth. This is a much-overlooked feature, largely owing to the fact that most operators do not prolong the anesthesia properly, enabling them to extract more carefully.

In all the cases operated upon there was perfect anesthesia, and ample time was secured for the careful extraction of from one to ten teeth.

Oral Surgery.

CLEFT-PALATE OPERATION. (By Dr. W. H. G. LOGAN, Chicago, Ill.)

Dr. Logan performed two cleft-palate operations.

CLEFT-PALATE OPERATION. (By Dr. TRUMAN W. BROPHY, Chicago, Ill.)

Dr. Brophy operated upon seven patients, five of whom had cleft palates and two hare-lips.

ROOT-AMPUTATION. (By Dr. CARL D. LUCAS, Indianapolis, Ind.)

The patient was a woman of forty-five years, fair, very nervous, anemic, with a chronic alveolar abscess with fistulous opening at the apex of the upper left canine, of six months' standing. The usual therapeutic measures had been employed previously, without eradication of the disease. X-ray examination confirmed the diagnosis.

The mouth was rendered sterile with a solution of phenolized water. A local anesthetic, codrenin, was injected into the pericemental membrane on all sides of the root, using a surgical hypodermic needle, 28 gage, one and one-half inches long. After the pericemental tissue had become thoroughly infiltrated, the needle was inserted into the fibrous pus sac at the apex, and this and the surrounding hypertrophied tissue thoroughly infiltrated. A line incision was then made, one and three-quarter inches long, parallel to the root. The soft tissues, gum, and periosteum were dissected 25 mm. in all directions beyond the fistulous opening in the labial plate of the alveolar process. The Buckley wound-retractor was applied, and the flaps were well retracted. The labial process was dissected laterally and vertically to the edges by plastic dissection, thereby exposing the apical third of the root. A straight-blade fissure bur—a cross-cut bur should never be used here—was employed, and the apical third excised. The excised portion was carefully removed, and with the aid of cylindrical carborundum stones, the mesial, distal, and labial surfaces of the remaining root were perfectly rounded. The lingual surface was rounded with a round bur, using a pulling motion, the portion of the blades next to the bur shank per-

forming this function. The wound was thoroughly irrigated with a solution of phenol, eight drops to three ounces of distilled water.

The margins of necrotic process were burred and curetted away, by using large spoon curets, and the wound thoroughly irrigated with the above solution. The retractor was removed, the wound packed with half-inch iodoform gauze, and the patient dismissed, with instructions to return to an assistant daily until dismissed.

Post-operative treatment. The packing must be removed each day for a period of one week, the wound irrigated with the phenol solution as above indicated, and then repacked with iodoform gauze. The second week the wound should be irrigated each day, but the packing may be discontinued. After the third week, the wound should be irrigated every second day until healed and closed.

Prosthodontia.

THE USE OF THE SNOW FACE-BOW IN MOUNTING THE WAX OCCLUSION AND CONTOUR MODELS. (By Dr. GEORGE H. WILSON, Cleveland, Ohio.)

Dr. Wilson demonstrated the mounting of the casts and wax occlusion and contour models on the Snow articulator by the aid of the face-bow. The face-bow does two things—transfers the three points of the Bonwill triangle and the occlusal plane of the patient to the articulator.

TIME-SAVERS IN PROSTHODONTIA. (By Dr. J. H. SOLECKI, Topeka, Kans.)

This clinic was given to show how a busy dentist can save many hours in prosthetic work. The clinic was divided into two parts:

(1) *Low-fusing Metal Inlays for Posterior Teeth Instead of Amalgam Fillings.* The clinician claims that the basis of any good low-fusing metal being pure tin, this material is far superior to the best amalgam. The broken-down molar or bicuspid can be better restored by an inlay than by an amalgam filling. By the following process, an inlay can be made in as short a time as a good amalgam filling:

The clinician casts inlays by centrifugal force. A simple device, on the order of a circle swing, will cast as many inlays as there are tin cups suspended from a wheel on a chain. The top of an old sewing machine is an ideal device for this purpose. Two, three, or four small tin cans suspended on a chain can be swung around, and thus as many inlays cast of low-fusing metal at a time. The wax impression is invested in a rubber ring instead of a steel ring, hence there is no waiting for the case to dry out, but it is put on a hot fire as soon as the investment has set enough to allow of handling. By the aid of this procedure four or more inlays can be inserted at the same sitting. This process can also be applied for gold inlays; here, however, a spring device is required to force the gold into the matrix.

(2) *Constructing an Artificial Denture Within Two Hours Without Vulcanizing.* After the teeth are articulated in the usual manner, the model is removed from the articulator. A piece of wax is placed at each heel to serve as a sprue, investment is mixed in a rubber bowl, and the case dipped into it, leaving the sprues exposed; as soon as the investment has set enough to allow of handling, the case is taken out of the bowl and set over a fire. After the wax has burned out, the case is removed from

the fire and set in an upright position, and low-fusing metal is poured from a ladle into one opening, until it comes out of the other.

The clinician uses "Molarine" low-fusing metal for all such work; it is his own product, and assured to be pure.

Gold Fillings.

GOLD FILLING IN THE DISTO-INCISAL SURFACE OF AN UPPER BICUSPID. (By Dr. WILLIAM FINN, Cedar Rapids, Iowa.)

Owing to failure to secure a patient, Dr. Finn demonstrated his method with a plaster model.

COMBINATION METHOD OF FILLING BICUSPIDS AND MOLARS WITH GOLD FOIL BY THE USE OF COHESIVE AND NON-COHESIVE GOLD. (Black's Method.) (By Dr. J. W. S. GALLAGHER, Winona, Minn.)

As the clinic in this section was a progressive one, it seemed impracticable to make a chair clinic of a gold foil operation, when a new set of observers would be at the chair every fifteen minutes. As each observer in this case would see but a small part of the operator's work, it seemed unfair both to him and to those interested in the demonstration to attempt a clinic of this kind.

Dr. Gallagher deemed it wise, therefore, to make his operation on the preceding day, and to exhibit his patient on the day of the clinic. At the Kansas City Dental College, before a few especially interested in this work, and a number of students, he made a gold foil operation in the mesio-occlusal surface of an upper second molar.

On the day of the clinic, the finished operation was examined by each set of participants, and attention was called to extension for prevention, contour, contact, occlusion, and interproximal space.

In a plaster model the clinician showed the cavity preparation, laying particular stress upon having parallel walls, cutting through the enamel to the dentin so as to form a step, a flat pulpal wall, and a flat gingival seat.

By the use of sheet wax, worked into cylinders and pellets representing gold foil, the clinician filled the cavity in the plaster model, demonstrating the placing and condensation of the non-cohesive cylinders, the placing of cohesive pellets, stepping of the plugger point, direction of force, and method used in finishing the filling so as to secure the desired self-cleansing embrasures, preservation of the interproximal space, proper contour, and contact.

GOLD FILLING IN THE APPROXIMAL SURFACE OF AN INCISOR. (By Dr. W. R. CLACK, Mason City, Iowa.)

The filling operation involved the mesial surface of an upper right lateral incisor. A "pinhead" gold filling had been inserted in this cavity, without extension, about two years previously. About a year after, this filling had failed at the lingual margin, and had been repaired with amalgam. The filling was leaking so badly that a slight touch of the excavator dislodged it.

The pulp was not involved, and no separation had been made. The margins were extended in all directions, viz, gingivally, under the free margin of the gum, lingually, and labially to the marginal angles of these surfaces, and incisally to the middle third of the incisal third of the tooth. The cavity was filled with No. 4 soft gold, annealed at the time of using.

The gold was condensed by hand pressure, supplemented by the hand mallet. Separation was obtained by wedging the gold against the distal surface of the central incisor. When finished, the gingival margin of the filling extended under the free margin of the gum, and the other three margins were exposed to the excursions of food and the action of the tongue, the lips, and the toothbrush.

Gold Inlays.

MANIPULATION OF WAX IN INLAY WORK. (By Dr. WM. MULLIN, La Grange, Ill.)

Fine Swiss saws, such as are used in the laboratory, are employed as a means of handling the wax model after it has been carved and polished and is ready to be taken out of the cavity. A piece of the saw—about three-quarters of an inch in length—is picked up with the fingers or pliers, heated, and stuck into the wax model at the most convenient point. The wax flows around the teeth of the saw, and this is cooled at once without using water. The saw attaches itself to the wax so firmly as to afford perfect control of the model. If the piece of saw is not at the point where the sprue wire is desired, another piece of saw is heated and stuck into the wax model at the desired point. With hot pliers the saw not in use is removed, after a hollow sprue wire has been slipped over the one in use and sealed. The hollow sprue wire used by the clinician is made by having a jeweler drill an opening through the Taggart sprue wire. If the Taggart machine is not used, one can make a hollow sprue wire from orthodontia tubing of proper size. By this method the wax model can be handled easily and quickly without coming in contact with the hands, and there is no possible chance of heat changing the form of the model.

If it is desired to carve the wax or to add wax, the saw, with the model attached, is fastened into a broach-holder, and in this manner the wax model can be handled without fear of changing.

This method is very useful when making a porcelain crown with cast base in a case where the bite is close. When the desired amount of porcelain is ground off and there is only a thin base of wax, the sprue wire can be attached by this method without changing the thin wax base.

METHOD OF REPAIRING, AND OTHER GOLD INLAY TECHNIQUE. (By Dr. CLARENCE O. SIMPSON, St. Louis, Mo.)

Faulty margins, particularly the gingival one, are repaired by finishing the inlay ready for cementation, removing it, cleansing and drying the cavity, then placing a small amount of thin cement or other adhesive on the gingival wall, and adjusting a suitable pellet of foil conforming to the discrepancy and extending over the margin. The inlay is then placed in the cavity, malleted to position, and removed without disturbing the condensed foil attached to the gingival wall. The cementation is then completed, and the foil projecting over the gingival margin is more thoroughly condensed by hand pressure, and finished with strips.

This method changes an imperfect inlay into a restoration comparing favorably with fillings in which tin or noncohesive gold—materials considered ideal for that purpose—is used for the gingival third.

The essayist showed methods for re-

inforcing wax models with 22-karat clipings to prevent distortion in removal; also the technique of partially investing wax models so that they can be hollowed and carved without injury.

A binocular loop—a double-magnifying lens worn as spectacles and permitting free use of the hands—was demonstrated as an aid in examination, cavity preparation, and inlay work.

INDIRECT METHOD OF FILLING. (By Dr. T. B. MAGILL, Kansas City, Mo.)

The cavity is prepared as for an ordinary inlay, so that the impression will draw. Then a small piece of modeling compound is heated until it is pliant, worked to a cone shape with the fingers, and cooled. The point of the cone is then heated, and a compressed impression of the cavity and also of a small portion of the tooth beyond the margin, is taken, but not of any part which forms an undercut. In this impression a cement model is poured, being careful to carry the cement to every part of the impression. When the cement is thoroughly set, the modeling compound is softened in warm water, and the impression removed from the cement model. In this cement model a mat gold filling or a matrix for a porcelain inlay, or any indirect filling may be made.

The method used for the mat gold filling is as follows: The cement model, which is a duplicate of the tooth to be filled, has sufficient resistance to withstand the pressure necessary for inserting a good mat gold filling, provided the cement model has been perfectly embedded in a good-sized piece of modeling compound or sealing-wax. The cavity is filled with mat gold by hand pressure and mallet, and finished by filing and trimming. The cement model is detached by warming the compound. The finished filling, which is to be used as an inlay, is removed from the cement model by cutting the back of the cement model with a thin stone or saw.

A small amount of inlay cement is placed in the cavity of the tooth, and the inlay is pressed into place. The time required for making this filling is about twenty minutes.

GOLD INLAY OVER AMALGAM MODELS. (By Dr. R. M. HILFINGER, Winfield, Kans.)

This method of making gold inlays is especially applicable in cases of mesio-disto-occlusal cavities in bicuspids, viz, cases in which it is extremely difficult to make an accurate wax pattern in the mouth, and also to seat the inlay perfectly after it has been made. The cavity is prepared in the usual manner, cutting liberally so as to expose the margins to the brush, and being careful that the buccal and distal walls are not wider mesio-distally at the contact points than at the neck of the tooth. Then an impression of the tooth is taken with modeling compound held in an aluminum or German silver ring. Next this impression is invested in plaster of Paris to strengthen it, and is then packed very carefully with copper amalgam which has been well amalgamated and softened. The copper amalgam is used because it can be reheated, and employed over and over again. After the amalgam has set, it is separated, leaving an amalgam model of the tooth from which an accurate wax pattern can be made. In investing the wax, it is better to use two sprues for large inlays, as this provides for more pressure at the gingival margins anteriorly and posteriorly. After the cast is made, the inlay is placed back upon the

amalgam model, put into the swager, and given three or four sharp blows with a heavy hammer, which will seat it more perfectly than could be accomplished in the mouth from a direct impression; besides, when the inlay is in the amalgam model, the gingival margins can be seen, which is often not the case in the mouth. After the inlay has been swaged to place in the model, it will go to place in the tooth just as readily and accurately, if the process of making the amalgam model has been properly carried out. For the sake of obtaining the bite and contact points, the amalgam model is placed in a modeling compound impression and mounted on an articulator, although this is not often necessary, for by close observation of the case in hand, the bite and contact points can be made approximately correct without the articulator. If the contact points are not quite full enough, a little 22-karat solder can be flowed on the inlay.

Gold Inlay Technique Clinic. (By Dr. Edgar D. Coolidge, Chicago.)

There are three causes for failure in inlay work:

(1) Faulty cavity preparation; (2) faulty wax technique; (3) cements.

(1) *Faulty cavity preparation.* The tendency is to form cavities for inlays with walls diverging to such an extent as to weaken the resistant and retentive form of the cavity. Wax can be removed from cavities with parallel walls when moist with saliva, and a successful inlay can be made and fitted into such a cavity. The same principles of cavity preparation should be used for gold inlays as for foil fillings, and a cavity prepared for one should be equally as good for the other filling method. The cavo-surface angle should be beveled as much for an inlay as for a filling. Special attention should be given to the gingival cavo-surface angle to insure that it is carefully beveled.

(2) *Faulty wax technique.* This is the most treacherous part of the whole inlay process. It is difficult to see whether the wax gives a perfect impression of the cavity, and many times faults are overlooked. Unless an equal amount of pressure is brought to bear upon every part of the cavity, there will be a lack of adaptation of the wax which, though unnoticeable, will result in a deficiency between the inlay and the margin of the cavity. If the wax is softened to a fine point, leaving the base of the cone quite hard, it will aid in getting the wax into deep cavities. Should the wax not show a perfect impression when removed, a little softer wax may be added to the deficient part, and the impression pressed to place again. If the wax model shows a perfect impression of every part of the cavity and is carefully invested, the cast made therefrom will very seldom be deficient. Occasionally small imperfections will be found on the cast, which prevent it from going to place. It is not always easy to find these imperfections, but they are usually present when the inlay does not go to place. The advantage of the heavy bevel of the cavo-surface angle at the gingival margin is that the cast will have a slight overlap or extension of gold to protect the cement. Shrinkage of the metal is not the cause of failures in small inlays. Faults in the waxing are the cause of most failures. Large inlays may be usually made in sections, which will reduce the shrinkage of the metal to a minimum.

Cements. The cement will do its part if the operator does his. Although the cements on the market today will wash

away in the saliva, yet, if they are protected by a properly fitting inlay, they will scarcely ever be the exclusive cause for failure.

Alloy Fillings.

Method of Manipulating Amalgam, with Special Reference to Packing and Condensing, Using a Quick-Setting Alloy. (By Dr. J Alden Bliss, Ruthven, Iowa.)

Various methods of applying matrices were also shown, including the use of copper of 34 gage, held in position by silk ligatures. After the filling had set, it was dressed to form and polished, care being taken to restore the anatomical proportions.

Amalgam Technique. (By W. G. Crandall, Spencer, Iowa.)

The subject of amalgam deserves a great deal more attention than it is getting. A vast majority of fillings are being made today with amalgam, and as a rule, they are made with very little care or attention to detail. If the patient will not or cannot have a gold filling or inlay, very often an amalgam filling is made, being the cheapest possible substitute, or the quickest means of getting rid of the patient. It is possible, however, to save teeth with amalgam when it has become a practical impossibility to save them with other materials. The first consideration should be good cavity preparation. [At this point the clinician demonstrated cavities cut in large plaster teeth.]

The size of the cavity makes very little difference. The seat should always be flat, or at least not concave; the lateral walls should be at right angles to the seat, forming as nearly as possible a box for the filling.

Amalgam, unless used in large bulk, tends to flow or move under pressure, therefore, it requires slightly more retention than gold foil or inlays. Because of the tendency of the material to fracture under heavy stress, its margins, wherever stress is brought to bear, should be at right angles as nearly as possible, but in no case should short or unprotected enamel rods be left at the margins. Wherever a cusp or wall is found at all weak, if it has to bear any amount of stress, it should be ground down far enough to insure sufficient bulk of amalgam for safety. It is no longer a question of esthetics, when a cavity is so large that the occlusal surface is entirely involved. Whenever it becomes necessary, therefore, to protect walls or cusps by grinding, they should be protected sufficiently, because the larger the bulk of amalgam, the stronger the filling will be, and the less it will flow.

The clinician then showed samples of amalgam crowns. These he makes in many instances in preference to gold crowns, for the gingival adaptation is so perfect that much less irritation results than if any other form of restoration is employed. The cavity preparation is very simple; usually, in teeth requiring so extensive a restoration, the pulp has become involved so that the pulp chamber may be used as an auxiliary anchorage. The gingival seats, both mesial and distal, are prepared in the same way as in large mesio-occluso-distal cavities; the buccal and lingual walls are then reduced to the point which the operator's judgment deems best. A distinct "step" or shoulder against both buccal and lingual walls is always made, serving a twofold purpose: First, as a retention; second, as anchorage for the amalgam near the dento-enamel junction, which will reduce

the flow to the minimum. The clinician never uses posts as anchorage for amalgam. If the bulk of the material is sufficient, the seat flat and broad, and the walls are square with a very slight undercut, the crown will "stay put," as the margins will be much more perfect than they could be made either with an inlay or a crown. If each step of the operation has been carried out with due care, the margins will remain perfect.

The most difficult part of making amalgam crowns is the placing of a well-fitted and strong matrix. The Ivory matrix No. 8 usually suffices for this, but one's ingenuity should be used. In very deep gingival cavities, it sometimes becomes necessary to solder a matrix for this purpose. In these extensive restorations it is usually best to leave the matrix on for several minutes, until the filling is well hardened.

The clinician also showed a so-called split matrix, which is most useful for approximal cavities. About 34-gage copper is well annealed and a strip cut off about one-third wider than the gingivo-occlusal diameter of the cavity. This strip is placed about the tooth in the desired position, and allowed to encircle the tooth as far as it will without inconvenience; the desired length is marked, also the point where the contact point should come to lie. It is then removed and cut off at the desired length, and with the rubber-dam punch a hole is made where the contact point should come to lie. The matrix is then slit from the occlusal edge down to this hole. With pliers little ears are turned up at the gingival angles so as to engage the ligature, the matrix is placed on the tooth and tied correctly. The flat floss used in prophylactic work is very convenient for trying this matrix, but ordinary dental floss will do. The ligature is placed once about the tooth and matrix, and a single knot is tied; then one end of the ligature is wound about the tooth so that it surrounds the tooth twice, but with only a single tie. The ligature should be held taut with one hand while with an instrument it is adjusted about the tooth and matrix and carried up above the gingival margin. If the opening for the contact is not in the proper place, it may be adjusted by drawing either end of the ligature. The ligature is then tied with a surgeon's knot, and wrapped about the tooth, tying mesially and distally, until the form of the interproximal space is produced as desired. After the first tying, the matrix should not be made too tight, but left so that some amalgam will be forced over the margins, for it will be found almost impossible to carry amalgam perfectly to the margins, if a small excess is not permitted.

In placing the filling, pluggers that will fit into the angles of the cavity are used to start with, and a quantity of the filling material is carried to place. The amalgam is condensed with great force, so that it will be spread tightly against and over the margins. The use of very heavy mallet force is expedient for condensing amalgam, the jar from the blow producing a greater density than it is possible to obtain with manual force. As large pluggers are used as can be manipulated in the cavity, thereby avoiding chopping, and condensing the material to a solid mass. A large excess of amalgam should be placed over the cavity and firmly malleted down with a plugger, sufficiently large to more than cover all margins. This will draw any excess of mercury to the surface and away from the margins, where the great-

est strength is desired. Any such excess should be removed and replaced with dry amalgam, until no excess of mercury is obtainable. Since amalgam is a plastic mass, pressure at one point tends to produce movements at all other points, which means that the only tight margin will be where the pressure was last applied. The only way to avoid this is by having a sufficient mass of amalgam to cover all margins, producing pressure simultaneously at all points. Amalgam is a congealing metal, and the tendency in any crystallizing mass is to dip at the center and round at the angles. This tendency is reduced to the minimum in accurately balanced alloys, but even in these it is present to a small extent, and the only means to overcome it consists in placing an excess that can be removed after a few minutes, or as soon as the first shrinkage in the setting mass has taken place, which period should not exceed from three to five minutes.

As soon as the amalgam is resistant and can be carved, the excess should be carved away with suitable instruments, the ligatures cut and removed. One end of the matrix is grasped with heavy pliers; while holding the opposite end firmly against the tooth, the matrix is torn a short distance from the contact toward the gingival margin, and removed. The other section can be readily removed. With this form of matrix, no space is lost by the thickness of the metal, and there is no occasion for disturbing the filling in its removal. It can be quickly and accurately applied, and when separation is desired, a separator can be placed over it.

By repeated experiments with the dynamometer the clinician has found that the greatest strength of amalgam can be obtained by thorough amalgamation, then expressing all excess mercury, and condensing the filling with heavy mallet force. The adaptation also is much improved by employing heavy force in condensing the material.

Careful tests made by the clinician with several mixtures of alloys with more or less mercury show a loss of strength of about thirty per cent. in "wet" mixtures as compared with the same amalgam when worked "dry."

The clinician exhibited and explained a new amalgam micrometer of his own design, and an amalgam dynamometer.

Crown and Bridge Work.

PROPHYLACTIC CROWNS AND BRIDGE ABUTMENTS. (By Dr. A. E. SCHNEIDER, Chicago, Ill.)

The clinician demonstrated prophylactic crowns and bridge abutments, showing what he considers to be the only two true prophylactic crowns that we have in dentistry today. There is absolutely no metal outside of the peripheral contour of the tooth or root, which means that it is absolutely impossible for food to accumulate at the junction of root and crown. This is accomplished by the principal step in the preparation of either crown—the inset shoulder, which is prepared with a plain fissure bur. This allows for a finishing of whatever material is used through a perfect butt joint of tooth and material.

The clinician first demonstrated a root prepared as any root might be prepared for a dowel crown, except that the shoulder was cut into the root to allow for a banded root and, at the same time, a smooth union of the tooth and material. By using, in this case, a Goslee tooth, one is able to make a bridge abut-

ment much more satisfactorily than with other methods.

The second crown demonstrated was a porcelain jacket crown, which allows of imitation of natural color, contour and general characteristics in every individual case. This crown can be used also as an abutment for all-porcelain bridges without metal construction, and it has been found to be of great durability. The operator must be particularly careful as to just where to place an all-porcelain bridge, so as not to have the bite too close. The principal requisite in all-porcelain bridges is a perfect occlusion; other conditions being normal, one need not worry as to the longevity of the bridge.

Various Methods in Making a Gold Base for a Porcelain Crown With and Without Casting. Method of Making a Gold Base Without Casting. (By Dr. Charles P. Grosby, St. Louis, Mo.)

The clinician showed a method of making a gold base without casting, the preparation of which consists in grinding the root both labially and lingually from a central point where a step cavity is formed, so that the finished gold base will straddle the exposed end, thus overcoming any tendency of rotation or displacement of the crown.

The labial bevel should usually extend from the lingual edge of the canal to a point sufficiently beneath the gum to allow for the thickness of the gold base.

The lingual bevel should not extend quite to the gum line, because of the absence of esthetic requirements upon this surface. When the preparation of the root is completed, and the porcelain crown adjusted properly to the root, the base is then ready to be made.

A 14- or 15-gage iridio-platinum bar is fitted to the enlarged canal, which has been previously enlarged to receive the dowel. A disk of .001 platinum foil is burnished to the prepared cavity, and the dowel placed in position. Soft gold is then packed into the matrix around the dowel and burnished to a close adaptation to the base of the root. This should then be removed and held in a pair of soldering pliers, and pure 22-karat solder used and sweated into the gold foil. This base should then be returned to the root, burnished, and removed, and more gold solder added until it is flush with the root.

The selected porcelain crown should then be treated likewise; after platinum foil has been burnished into the crown and an iridio-platinum post of 14 or 15 gage placed in position, pure gold foil is packed into the matrix and around the dowel and burnished to close adaptation. This is then removed, and 22-karat solder is flowed into the foil. This is then replaced upon the base of the crown, after the latter has been properly ground to fit to the root. When the base for the root and the crown is completed, both are ground and fitted together. They are then waxed together in the mouth, removed, invested, and soldered.

The clinician also demonstrated the casting process of a gold base by using .001 platinum foil matrix burnished over the prepared base of the root and a 14-gage iridio-platinum dowel forced through the matrix into the enlarged canal that has previously been prepared. Inlay wax is pressed into the matrix and around the dowel, and burnished to close adaptation to the root base. It is then removed and cast. The same method can be applied to the porce-

lain crown, the procedure being the same as has been previously described.

It was also demonstrated how a badly decayed root with a canal opening enlarged by caries can be saved and rendered useful. As a rule it is advised to extract such roots, but by the following method they may be made useful so as to last for a number of years.

After the root has been properly prepared and treated, and all carious matter removed, the apex is filled. A porcelain crown is adapted closely to the labial part of the root and removed. A 14-gage iridio-platinum post, cut to proper length and having been tried to the root with the crown in position, is then cemented to the root at the apex with a very little amount of cement, which is allowed to set. The porcelain crown is then placed in position so as to assure the exact position of the post. The crown is then removed, and amalgam is packed into the root-canal and around the post gently but firmly, and when the amalgam is flush with the surface of the root, the porcelain crown is placed in position and gently forced to proper adaptation to the root. The excess mercury and amalgam is wiped away, the crown again pressed in position and lightly malleted to place, and whatever excess amalgam there may be is again wiped away, the crown is gently removed and the amalgam allowed to set.

The porcelain crown should then be permanently attached with cement. The advantages claimed for this method are the protection afforded to the end of the root by the amalgam; accuracy of adaptation between the crown and root, which is facilitated by manipulation while the amalgam is in a plastic form; absence of stress on the broken root, which would be present if a very heavy gold casting were cemented to the root, the weight of which might consequently crack the root. The clinician has inserted this kind of crown in the mouths of patients for several years with lasting good results.

(I) The Use of Plain Teeth in the Construction of a Porcelain Denture on Platinum Base. (II) Porcelain Gum Restoration in Removable Bridge Work. (III) Combination Cast Denture of Porcelain and Rubber Attachment. (By E. B. Ducasse, New Orleans, La.)

The clinician explained his method of constructing a porcelain denture on a platinum base, whereby the time necessary for construction, the weight of the plate, and the intricacy of the work are minimized.

After the base has been struck up in the usual manner, a platinum wire of about 16 gage is soldered along the labial and buccal periphery, extending to the tuberosities, but not bringing the wire around the lingual surface, as is customary in a gold base. Five lugs of platinum are soldered on the base for the attachment of the porcelain, using platinum solder and the oxyhydrogen blowpipe. The teeth are then set in proper alinement and articulated, the proper contour and fulness are obtained in wax, and the work is tried in the mouth.

Instead of continuous-gum teeth, ordinary plain teeth are used, roughing or stoning every surface that will come in contact with the porcelain.

The next step consists in passing a platinum wire of about 23 gage through a lug on one side to one on the opposite side, thus forming a temporary attach-

ment to hold the platinum base in its proper position in the investment. The teeth are held in the investment by their pins, Standard investment being used.

After the boiling-out of the wax, the case should be heated slowly and brought to a high heat in order to remove all particles of wax and residue. At first the teeth will be noticed to turn dark, owing to the burning of foreign matter. Upon cooling, porcelain is immediately packed along the buccal and labial aspects. Since the shrinkage of porcelain is most perplexing and its contraction must be overcome, a form of concrete composed of equal parts of granulated porcelain, which fuses at 2600° F., and S. S. White's highest fusing body, is employed.

By using this mixture shrinkage is overcome to a vast degree. The work is then set into the furnace, and fired.

The case should be allowed to remain in the furnace until it is well cooled, which requires approximately two and one-half hours. When the case is cool, the investment and wire attachment are removed, since they have fulfilled their purpose, and the lingual surface is treated in the same manner as the buccal and labial. A mixture of gum enamel is then placed where needed. The case is then ready to receive its second firing. Many firings are required if fissures and porosity exist.

(II) In a case where much absorption has taken place owing to traumatism or to a pathological condition, and where the lip is short, the use of long facings renders the work unsightly. To make an esthetic bridge, the clinician suggested the use of dummies of the same size as the lost teeth, and restoration of the soft tissues in porcelain. His method of procedure is as follows:

The abutments are removable, consisting of a spring or clamp which holds them firmly in position. These clamps are reinforced by a lug, which takes up the stress of mastication and prehension. The clamps work in a cone-shaped tube of iridio-platinum plate, which is cemented in the roots.

Dummies are placed and waxed in their relative positions, removed, and invested. After boiling out the wax, a slot of iridio-platinum of 36 gage is placed around or over the pins, and soldered with platinum solder.

The skeleton or frame thus formed is placed on the cast, and wax is used to take up the absorption. It is then removed, and the lingual surface is treated with platinum foil. After investing again, the wax is removed, and porcelain is added and fired.

The dummies now become a gum section as it were.

The next step consists in removing the platinum foil, and a cast backing is made. This backing or cast is soldered to the abutments, and the gum section is then cemented to place.

(III) After the base has been cast or swaged as for a metal denture with vulcanite attachment, the following *modus operandi* is adopted:

The teeth having been properly set up, a wire is applied from one second bicuspid to the other, so that the labial and buccal sections can be readily removed without distortion and treated as follows:

Platinum foil is burnished on the lingual surface and tacked, and the case invested. After boiling out the wax, the porcelain is built up and fired, giving a gum section of ten teeth. This section is placed on the base and vulcanized

in the usual manner, the molars having been vulcanized previously.

Coloring Porcelain. (By Dr. E. E. Haverstick, St. Louis, Mo.)

The clinician demonstrated his methods of changing the color of porcelain teeth by applying to their surface a moderately high fusing porcelain enamel, mixed with mineral stains and distilled water, and of coloring by mineral stains mixed with oil, which is the less desirable procedure. He also demonstrated porcelain inlays for anterior teeth from which the gums have badly receded, and which have large cavities. Porcelain is built in the upper portion of the inlays as to somewhat resemble the shape of the gum, and this portion is colored pink to match the color of the gum.

Porcelain Jacket Crowns. (By Dr. C. M. Work, Ottumwa, Iowa.)

The clinician demonstrated his method of restoring badly broken molars and bicuspids by the use of porcelain in the occlusal surface to avoid the exhibition of too much gold. First a band of 22-karat gold plate is soldered with 22-karat solder, measuring half the length of the crown of the tooth to be restored.

A partition is then placed in the band at the top of the root, and the occlusal surface is restored by baking-in Jenkins' prosthetic porcelain. The accompanying illustration shows the completed crown in position.

APPENDIX.

Organization of the N. D. A.

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IN addition to the foregoing list of members, the following societies paid dues into the National, at or prior to the Kansas City meeting, on the basis of one dollar per member, for all or a part of their membership:

Maryland State Dental Society,
District of Columbia Dental Society,
Kansas State Dental Society,
Oklahoma State Dental Society,
New Mexico State Dental Society.

The official Transactions are to be furnished to these members.

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Rambo, Samuel, Montgomery, Ala.

PAST PRESIDING OFFICERS.

I. PRIOR TO CONSOLIDATION.

Ex-Presidents American Dental Association.

1859. *W. W. Allport, Chicago, Ill.
First meeting, for organization.
1860. *W. H. Atkinson, Cleveland, Ohio.
1861. (No meeting.)
1862. *George Watt, Xenia, Ohio.
1863. *W. H. Allen, New York, N. Y.
1864. *J. H. McQuillen, Philadelphia, Pa.
1865. *C. W. Spalding, St. Louis, Mo.
1866. *C. P. Fitch, New York, N. Y.
1867. *A. Lawrence, Lowell, Mass.
1868. *Jonathan Taft, Cincinnati, Ohio.
1869. *Homer Judd, St. Louis, Mo.
Owing to a change in the constitution, officers elected at this and the sessions following served at the annual meeting subsequent to their election.
1870. *W. H. Morgan, Nashville, Tenn.
1871. *Geo. H. Cushing, Chicago, Ill.
1872. *P. G. C. Hunt, Indianapolis, Ind.
1873. *T. L. Buckingham, Philadelphia, Pa.
1874. *M. S. Dean, Chicago, Ill.
1875. *A. L. Northrop, New York, N. Y.
1876. *Geo. W. Keely, Oxford, Ohio.
1877. *F. H. Rehwinkel, Chillicothe, Ohio.
1878. *H. J. McKellops, St. Louis, Mo.
1879. *L. D. Shepard, Boston, Mass.
1880. *C. N. Peirce, Philadelphia, Pa.
1881. *H. A. Smith, Cincinnati, Ohio.
1882. *W. H. Goddard, Louisville, Ky.
1883. E. T. Darby, Philadelphia, Pa.
1884. *J. N. Crouse, Chicago, Ill.
1885. *W. C. Barrett, Buffalo, N. Y.
1886. *W. W. Allport, Chicago, Ill.
1887. *Frank Abbott, New York, N. Y.
1888. C. R. Butler, Cleveland, Ohio.
1889. M. W. Foster, Baltimore, Md.
1890. *A. W. Harlan, Chicago, Ill.
1891. W. W. Walker, New York, N. Y.
1892. J. D. Patterson, Kansas City, Mo.
1893. (Formal session only, owing to the holding of the World's Columbian Dental Congress; officers elected in 1892 holding over until 1894.)
1894. *J. Y. Crawford, Nashville, Tenn.
1895. *J. Y. Crawford, Nashville, Tenn.
1896. James Truman, Philadelphia, Pa.

Ex-Presidents Southern Dental Association.

1869. *W. T. Arrington, Memphis, Tenn.
First meeting for organization; Jas. S. Knapp being chairman *pro tem.*
1870. *W. T. Arrington, Memphis, Tenn.
1871. *Jas. S. Knapp, New Orleans, La.
1872. *F. Y. Clark, Savannah, Ga.
1873. *H. M. Grant, Abingdon, Va.
1874. *Robert Arthur, Baltimore, Md.
1875. *J. R. Walker, New Orleans, La.
1876. *W. T. Arrington, Memphis, Tenn.
1877. *W. G. Redmund, Louisville, Ky.
1878. S. J. Cobb, Nashville, Tenn.
1879. F. J. S. Gorgas, Baltimore, Md.
1880. *J. B. Patrick, Charleston, S. C.
1881. V. E. Turner, Raleigh, N. C.
1882. E. S. Chisholm, Atlanta, Ga.
1883. L. D. Carpenter, Atlanta, Ga.
1884. *H. J. McKellops, St. Louis, Mo.
1885. *A. O. Rawls, Lexington, Ky.
1886. *W. C. Wardlaw, Augusta, Ga.
1887. *W. W. H. Thackston, Farmville, Va.
1888. *B. H. Catching, Atlanta, Ga.
1889. *J. Y. Crawford, Nashville, Tenn.
1890. *John C. Storey, Dallas, Texas.
1891. G. F. S. Wright, Georgetown, S. C.
1892. Gordon White, Nashville, Tenn.
1893. B. Holly Smith, Baltimore, Md.
1894. (Same officers held over.)
1895. *H. E. Beach, Clarksville, Tenn.
1896. John S. Thompson, Atlanta, Ga.
1897. W. H. Richards, Knoxville, Tenn.

* Deceased.

II. SINCE CONSOLIDATION.

Ex-Presidents National Dental Association.

1897. *Thomas Fillebrown, Boston, Mass.
1898. Harvey J. Burkhart, Batavia, N. Y.
1899. B. Holly Smith, Baltimore, Md.
1900. G. V. Black, Chicago, Ill.
1901. J. A. Libbey, Pittsburgh, Pa.
1902. L. G. Noel, Nashville, Tenn.
1903. *C. C. Chittenden, Milwaukee, Wis.
1904. Waldo E. Boardman, Boston, Mass.
1905. M. F. Finley, Washington, D. C.
1906. A. H. Peck, Chicago, Ill.
1907. William Carr, New York, N. Y.
1908. V. E. Turner, Raleigh, N. C.
1909. Burton Lee Thorpe, St. Louis, Mo.
1910. Edward S. Gaylord, New Haven, Conn.
1911. A. R. Melendy, Knoxville, Tenn.
1912. F. O. Hetrick, Ottawa, Kans.

* Deceased.

NATIONAL DENTAL ASSOCIATION.

Constitution and By-laws

AND

Code of Ethics.

CONSTITUTION.

ARTICLE I—*Name.*

The name of this organization shall be THE NATIONAL DENTAL ASSOCIATION.

ARTICLE II—*Object.*

The object of this association shall be to promote the art and science of dentistry. To achieve this the association shall endeavor to unite the dental profession of the United States into one compact body, thus creating a power the units of which, working with a harmony of purpose, will foster fraternal relations and intercourse among dentists; safeguard the material interests of the profession; elevate the standards and improve the methods of dental education; secure the enactment and enforcement of just dental laws, while aiming at a unification of state dental statutes, and enlighten and direct public opinion in relation to oral hygiene, dental prophylaxis, and advanced scientific dental service.

ARTICLE III—*Membership.*

The membership of this association shall consist of the present members, and such members of the constituent societies, and such members of the army dental corps, and of the navy dental corps, and such others as shall be elected in accordance with the By-laws, as hereinafter provided.

ARTICLE IV—*Constituent Societies.*

SECTION 1. State and territorial societies which have, or which hereafter may, become organized in conformity with the general plan of the National Dental Association, and which have declared their allegiance to said National Dental Association, and which shall agree to the formation and perpetuation of the House of Delegates, shall be recognized as constituent societies.

SEC. 2. The term "state society" shall be understood to mean the representative dental organization of any one of the states which have been received into the Union, and whose active membership is restricted to legal practitioners practicing within the legal borders of such state. The term "territorial society" shall apply in similar manner to the representative dental organization of any of the territorial possessions of the United States. Provided, however, that the term "territorial society" shall be held to include the societies of the District of Columbia, of the Canal zone, and of the insular possessions of the United States.

ARTICLE V—*The House of Delegates.*

SECTION 1. There shall be a business body known as the House of Delegates of the National Dental Association. It shall consist

of delegates elected by the constituent societies, and by the other dental bodies named in Section 2 of this article. The House of Delegates shall represent the delegated powers of the members of the National Dental Association, and shall be the national representative body of the constituent societies. It shall elect the general officers of the association and a board of nine trustees, and shall transact all the business of the association, public, professional, or scientific, not otherwise provided for. The trustees shall be members of the House of Delegates, without the right to vote.

SEC. 2. The total voting membership in the House of Delegates (exclusive of the Board of Trustees) shall be as follows: One delegate shall be allowed from each scientific section, from the army dental corps, from the navy dental corps, and one from each constituent society. Each constituent society shall be entitled to one additional delegate if one hundred of its members become regularly enrolled as members of the National Dental Association; and one more delegate for each additional two hundred members enrolled.

Explanatory.—Regardless of enrollment in the National Dental Association each constituent society would have 1 delegate; with

100	members	in	the	National,	2	delegates.
300	"	"	"	"	3	"
500	"	"	"	"	4	"
700	"	"	"	"	5	"
900	"	"	"	"	6	"
1100	"	"	"	"	7	"
1300	"	"	"	"	8	"
1500	"	"	"	"	9	"

In case any states do not affiliate, all members of the National Dental Association residing in such states may meet together at the first meeting of any session of this association, and elect one delegate to represent them in the House of Delegates.

ARTICLE VI—*Sections.*

SECTION 1. This association shall be divided into three sections, as follows:

Section I shall have charge of operative dentistry, nomenclature, literature, dental education, and allied subjects.

Section II shall have charge of oral surgery, anatomy, physiology, histology, pathology, etiology, prophylaxis, oral hygiene, materia medica, and allied subjects.

Section III shall have charge of prosthodontia, orthodontia, metallurgy, chemistry, and allied subjects.

SEC. 2. New sections may be created, or existing sections discontinued or modified, by the House of Delegates.

SEC. 3. There shall also be a State Society Officers' Section, composed of the presidents, vice-presidents, secretaries, and treasurers of the constituent societies. All members of this section shall retain their active membership for one year after their official connection with their respective societies, and shall thereafter be honorary members of this section. All past presidents of state societies shall be honorary members of this section.

ARTICLE VII—*Scientific Foundation and Research Commission.*

The association shall organize and maintain a Scientific Foundation and Research Commission of twenty-five members, who shall be elected by the Board of Trustees.

ARTICLE VIII—*Branches.*

In addition to the existing Southern Branch, the House of Delegates may create such branch organizations as may be deemed essential to the welfare of the National Dental Association and of the dental profession.

ARTICLE IX—*Annual Sessions.*

The National Dental Association shall hold an annual session at the time and place chosen by the House of Delegates. The time and place for the session, however, may be changed by a two-thirds vote of the Board of Trustees, but not later than sixty days prior to the time selected for the session.

ARTICLE X—*Officers.*

SECTION 1. The general officers of the association shall be a president, three vice-presidents, a general secretary, and a treasurer.

SEC. 2. These officers shall be elected annually by the House of Delegates, to serve for one year, or until their successors shall have been elected and installed.

SEC. 3. No member of the House of Delegates shall be eligible to the office of president or vice-president.

ARTICLE XI—*Board of Trustees.*

SECTION 1. The Board of Trustees shall have charge of the property and of the financial affairs of the association. Appropriations for other than ordinary expenses of the association shall have the approval of a majority vote of the House of Delegates.

SEC. 2. Three trustees shall be elected annually by the House of Delegates, each to serve for a period of three years.

SEC. 3. No voting member of the House of Delegates shall be eligible to election on the Board of Trustees, but the Board of Trustees after election shall be members of the House of Delegates, without the right to vote.

SEC. 4. No member who has served one full term as a member of the Board of Trustees shall be eligible for re-election on the board until a period of three years has elapsed, provided that this does not apply to *ex-officio* members of the board.

ARTICLE XII—*Dues and Assessments.*

SECTION 1. The annual dues in this association shall be one dollar, payable January 1st for the ensuing year.

SEC. 2. Members of the army and navy dental corps may be elected to full membership, with all privileges, on payment of the annual dues.

SEC. 3. All members of the National Dental Association in good standing shall receive the Journal free. To members of state dental societies not enrolled in the National Dental Association the subscription to the Journal shall be two dollars; and to all others the subscription shall be three dollars; provided that if this should be in conflict with the rules of the United States postal authorities the Board of Trustees may reduce the general subscription to two dollars.

SEC. 4. In case of need, in order to raise funds, the House of Delegates may order an assessment not to exceed two dollars in one year, for each member; or an assessment not to exceed fifty dollars in one year upon each constituent society, but not both.

ARTICLE XIII—*Amendments.*

The House of Delegates may amend or alter this Constitution at any annual session, due notice having been given at a previous meeting of said annual session, provided unanimous consent may be obtained. Otherwise all amendments must lie on the table until the annual session next following their introduction, at which time a two-thirds vote will be requisite for their adoption. In the latter procedure due notice of the substance, or if not too lengthy the exact wording, of the proposed changes must be sent to each member of the House of Delegates with the regular notice of the annual session.

BY-LAWS.

BOOK I: MEMBERSHIP.

CHAPTER I—*Qualification for Active Membership.*

SECTION 1. A member in good standing of a constituent society shall be eligible for membership in the National Dental Association on presentation to the general secretary of the following: (1) Satisfactory evidence of the above; (2) written application for membership on the prescribed form; (3) the annual dues.

SEC. 2. Members of the army and navy dental corps may become members in like manner, upon presenting satisfactory evidence of membership in said corps.

SEC. 3. Members must retain their membership in constituent societies. Upon official notification from a constituent society that a member has lost this qualification, the general secretary will erase the delinquent's name from the roll of membership of this association, and notify him of this action, stating the reason therefor.

SEC. 4. Any member who has forfeited his membership in accordance with Section 3 shall be reinstated on his request by the general secretary, on presentation of satisfactory evidence that his qualification has been restored by the constituent society.

SEC. 5. Any member who shall fail to pay his annual dues for one year, unless absent from the country, shall be dropped from the roll of members, provided that due notice shall be previously given to the member by the general secretary. Any member who has been suspended for non-payment of dues shall be restored only when all his dues have been paid.

SEC. 6. A member who becomes a resident of another state, to retain his membership in

the National Dental Association must become a member of the constituent society in the state to which he has removed.

Chapter II—*Registration.*

Section 1. No member shall take part in the proceedings of the association or of any of the sections until he has registered his name and address with the proper officer or committee and has paid his annual dues for the current year.

Sec. 2. A member desiring to take part in the scientific work of the association shall indicate, when registering, the section in which he wishes to be enrolled.

Chapter III—*Delegated Members, Honorary Members, Associate Members, etc.*

Section 1. Members delegated to the house of Delegates shall register and pay their annual dues, thus qualifying as members of this association, before taking their seats in the House of Delegates.

Sec. 2. Dentists who have risen to preeminence in foreign countries shall be eligible to honorary membership. They may be elected by the house of Delegates on nomination by a section, but not more than three honorary members shall be elected in any one year.

Sec. 3. Associate membership may be granted by the House of Delegates to distinguished visitors. Such membership accords all privileges for one year, including the Journal of the association.

Sec. 4. Membership of all classes may be declared forfeited by the House of Delegates for reasons considered sufficient by that body.

BOOK II: DELEGATES.

Chapter IV—*Qualifications, Terms, and Registration of Delegates and Alternates.*

Section 1. No one shall serve as a member of the House of Delegates who is not a member of this association.

Sec. 2. Delegates and alternates from the scientific sections and from the army and navy dental corps shall be elected for one year. Delegates and alternates from constituent societies shall be elected for two years. Constituent societies entitled to more than one delegate shall elect them so that one-half, as near as may be, shall be elected each year.

Sec. 3. Beginning with the annual session of 1913, the House of Delegates shall be constituted as described in Article V of Section 2 of the Constitution. The number of delegates to which each constituent society may be entitled shall be based on the number of members from whom dues for the current year shall have been received by the general secretary of this association at least thirty days prior to the first day of the annual session of this association.

Sec. 4. In the cases of those constituent societies which do not hold meetings of the current year at least forty-five days prior to the annual session of this association the number of delegates shall be estimated on the dues for the previous year received by the general secretary of this association.

Sec. 5. To be represented in the House of Delegates the officers of each constituent society shall file with the general secretary of this association, at least thirty days prior to the first day of the annual session, a list of the names of its delegates and alternates.

Sec. 6. Previous to the annual session the general secretary of this association shall prepare and have printed a list of the delegates and alternates elected by the various constituent societies; also the number of paid members of each. In case any society has elected more delegates than the number to which its paid membership shows it to be entitled, the general secretary in preparing the list shall drop one or more names from the list of such society, beginning at the bottom of the list, until the proper number of names remain.

Sec. 7. At any election of delegates, the body electing may at the same time elect as many alternates as delegates, and the alternate of each delegate may sit in his stead in the House of Delegates in the absence of the regular delegate from any annual session, except as provided in Section 9 of this chapter.

Sec. 8. Every delegate must present his credentials and be duly registered by the general secretary, or other designated officer or committee, before taking part in the business of the House of Delegates. Credentials shall include a certificate duly signed by the proper officials of the body delegating him, and such other evidence as may be required.

Sec. 9. The credentials of a delegate having been accepted and his name placed on the roll of the House of Delegates, he shall remain the duly accredited delegate of the body which he represents until final adjournment of the session; providing that when an accredited delegate finds it impossible to continue his service, his regularly selected al-

ternate shall be entitled to be seated. In the absence of the regular alternate, such vacancy shall be filled by the delegates from such state, from the alternates present.

CHAPTER V—*Proeedure of House of Delegates.*

SECTION 1—*Order of business.* The following shall be the order of business unless changed by unanimous consent:

1. Call to order by the president.
2. Roll-call.
3. Reading and adoption of minutes.
4. Reports of officers.
5. Reports of committees.
6. Unfinished business.
7. New business.

SEC. 2. No new business shall be introduced into the House of Delegates on the last day of the annual session unless with unanimous consent; and such new business, whether in the form of a resolution, memorial or otherwise, shall require a unanimous vote for final action.

SEC. 3. The House of Delegates shall be governed by Roberts' Rules of Order, when not in conflict with these By-laws or with the rules of the house.

SEC. 4. One-fifth of the voting members of the House of Delegates shall constitute a quorum.

CHAPTER VI—*Meetings of the House of Delegates.*

SECTION 1. The House of Delegates shall meet annually on the day preceding the opening of, and at the same place as, the annual session of the association.

SEC. 2. Special sessions of the House of Delegates shall be called by the president, or written request of a sufficient number of delegates to represent a majority of the constituent societies, by mailing a written or printed notice to the last known address of each delegate, at least twenty days before such special session is to be held, in which shall be specified the time and place of meeting and in general terms the objects of such special session, and no other business shall be transacted thereat. The time and place for the meeting of a special session must be given in the requests signed by the delegates.

CHAPTER VII—*Nomination, Election, and Installation of Officers, Trustees, Honorary Members, Associate Members, etc.*

SECTION 1. Nominations for office, except that of treasurer, shall be made orally, but no nominating speech shall exceed two minutes in length. Any nominee receiving the majority of the votes cast shall be declared elected. The treasurer shall be nominated by the Board of Trustees, who shall present two names.

SEC. 2. All elections shall be by ballot, and a majority of the votes cast shall be necessary to elect. In case no nominee receives a majority of the votes on the first ballot the nominee receiving the least number of votes shall be dropped, and a new ballot held. This procedure shall be continued until one of the nominees receives a majority of all votes cast, when he shall be declared elected.

SEC. 3. The election of officers shall be the first order of business of the House of Delegates after the reading of the minutes on the afternoon of the third day of the annual session.

SEC. 4. Nominations for honorary membership from the sections shall be referred without debate to the Committee on Sections and Section Work, which shall consider the relative scientific attainments and professional character of the nominees, and shall report its conclusions to the House of Delegates for action. The election of honorary members shall immediately follow the election of officers.

SEC. 5. Nominations for associate membership may be made by the sections at any meeting of the House of Delegates, and may be confirmed, with or without reference to the Committee on Sections and Section Work, at the will of the majority of the House of Delegates.

SEC. 6. The general officers of the association shall be installed at the close of the last meeting of the annual session at which they are elected.

BOOK III.

CHAPTER VIII—*Officers, Trustees, Research Commission, and Committees.*

SECTION 1—*President.* The president shall preside at the general meeting and at the meetings of the House of Delegates, and shall perform such duties as custom and parliamentary usage require. On the morning of the first day of the annual session following his election he shall deliver an address at the general meeting not exceeding forty minutes in length.

SEC. 2 — *Vice-presidents.* The vice-presidents shall assist the president. During his

absence or at his request one of them shall officiate in his place. In case of the death, resignation, or removal of the president, the vacancy shall be filled by the ranking vice-president.

SEC. 3—*General Secretary.* The general secretary shall give due notice of the time and place of all annual and special sessions of the association and of the House of Delegates, by publishing the same in the Journal of the National Dental Association and other journals. He shall notify members of committees of their appointment, and of the duties assigned to them. It shall be his duty to verify the credentials of members of the House of Delegates and to provide a registration book for them, in which shall be recorded the name of each delegate in attendance at each session. He shall collect all dues and transmit the same to the treasurer, as may be directed by the Board of Trustees, and as receipt for dues shall issue certificates of membership. He shall conduct all correspondence required of him by the association or by the House of Delegates, or which may become necessary in the rightful conduct of his office. He shall keep in separate books the minutes of the general meetings and of the House of Delegates. He shall prepare a roll of the delegates attending each session to facilitate voting by roll-call. He shall prepare for publication the official program of each session, and shall perform such other duties as may be directed by the association or by the House of Delegates, and shall receive a salary to be fixed by the Board of Trustees.

SEC. 4—*Treasurer.* The treasurer shall be the custodian of all moneys, securities and deeds belonging to the association, and shall hold the same, subject to the direction of the Board of Trustees. He shall give to the Board of Trustees a suitable bond, and shall receive a salary to be fixed by the Board of Trustees.

CHAPTER IX—*Board of Trustees.*

SECTION 1. The Board of Trustees shall have charge of all properties and of the financial affairs of the association. At the first meeting of the board after the annual session of the association it shall organize. In addition to the nine elected members of the Board of Trustees, the president and general secretary shall be *ex officio* members and shall hold the same positions in the board as in the association, but the board shall elect a recording secretary from its own members, who shall keep its records and make its reports.

SEC. 2—*Journal.* It shall be the duty of the Board of Trustees to provide for and superintend the publication of the Journal of the National Dental Association, and of all proceedings, transactions, and memoirs of the association, subject to the approval of the House of Delegates. It shall have full discretionary power to omit from the Journal of the National Dental Association, in part or in whole, any paper that may be referred to it by any of the sections. It shall appoint a general manager and editor of the Journal, which two positions may be held by one person, and such assistants as may be necessary, and shall determine the terms and conditions of their employment, subject to the approval of the House of Delegates.

SEC. 3—*Meetings during annual sessions.* During the annual session of the association the board shall hold meetings as often as may be deemed necessary by the president, and all matters referred to it by the House of Delegates shall be reported on within twenty-four hours, if so ordered by the house.

SEC. 4—*Board reports.* The Board of Trustees shall have the accounts of the treasurer and of the Journal office audited annually, or oftener if deemed necessary, and shall make an annual report on the same to the House of Delegates, which report shall also specify the character and cost of all the publications of the association during the year and the amount of all property belonging to the association.

SEC. 5—*Vacancies.* In case of vacancy in the office of treasurer or board secretary, the vacancy shall be filled by the Board of Trustees.

SEC. 6—*Salaries.* The Board of Trustees shall fix the salaries of the general secretary, the treasurer, the board secretary, and of the Journal manager and the editor.

SEC. 7—*Regular meetings of board.* Regular meetings of the Board of Trustees shall be held immediately after the annual session of the association and at the same place, and on the first Monday in the month of February, of each year, at such place as the board may select at its first meeting.

SEC. 8—*Special meetings of board.* Special meetings of the Board of Trustees may be called at any time by the president, or by request of five members of the board, due notice of which must be given to each member of the board at least five days in advance of the meeting. The general object of a special meeting must be stated in the notice, and no other business may be transacted.

SEC. 9—*Annual sessions, exhibits, clinics, and general arrangements.* The Board of Trustees shall have full control of all arrangements for the annual sessions, and shall provide meeting-places for the association, the House of Delegates and the various sections. It shall also have control of all clinics and of all exhibits. The Board of Trustees in their discretion may appoint a local committee of arrangements, which shall at all times be under the control of the Board of Trustees.

CHAPTER X—*Scientific Foundation and Research Commission.*

SECTION 1. This commission shall consist of twenty-five members, who shall be elected by the Board of Trustees, not more than two of whom shall be from any one state. In addition to the twenty-five members elected by the Board of Trustees, the president and general secretary shall be *ex officio* members. They shall serve for five years, except that of the first commission five shall serve for one year, five for two years, five for three years, five for four years, and five for five years, as shall be designated when they are elected. They shall meet annually at the time of the meeting of the National Dental Association and at such other times as shall be designated by their Executive Board.

SEC. 2. The duties of the commission shall be to raise funds for carrying on exhaustive dental and oral research, to disseminate scientific knowledge, to support, establish, and encourage research, and such other duties as shall pertain to the furthering of this cause. They shall select from their number an Executive Board of five members, which shall, when the commission is not in session and has not given specific directions, have general control of the administration of the affairs of the commission and general supervision of all arrangements for administration, research, and other matters undertaken or promoted by the commission. They shall organize and incorporate a corporation to be known as the National Dental Research Foundation and Institute, or such other name as the commission shall select, which corporation shall receive, invest, and disburse all the moneys provided by the commission and by themselves. They shall organize this corporation in accordance with the laws and requirements controlling such institutions, except that not less than one-third of the trustees of said corporation shall be provided by the National Dental Association. This corporation shall seek bequests, endowments, fellowships, and such other contributions as shall perfect the purpose and plan of the National Dental Association. They shall make a written annual report to the commission and to the National Dental Association.

CHAPTER XI—*Committees.*

SECTION 1. Committees shall be classified as (a) standing committees, (b) reference committees, (c) special committees. These committees shall be nominated by the president and elected by the House of Delegates, unless otherwise provided.

SEC. 2—*Committees, appointment and powers.* Reference committees shall be nominated from among the House of Delegates, but any member of the association shall be eligible to serve on standing or special committees. All members of committees who are not members of the House of Delegates shall have the right to present their reports in person to the House of Delegates, and to participate in the debate thereon, but shall not have the right to vote.

SEC. 3—*Standing committees.* Standing committees shall be as follows:

(a) A Judicial Council.
(b) A Committee on Dental Education.
(c) A Committee on Dental Legislation.
(d) A Committee on Transportation and Place of Session.

SEC. 4—*Judicial Council.* The Judicial Council shall be composed of five members, to be appointed by the president on the first day of each annual session from the delegates present, and to continue in office until their successors are appointed. It shall organize by electing a chairman and a secretary. The latter shall keep a permanent record of its proceedings, shall conduct all correspondence, etc. The Judicial Council shall hold such meetings during the annual session, and during the year, as it may deem necessary. Three members shall constitute a quorum. It shall make an annual report of its proceedings to the House of Delegates. To this council shall be referred all questions, complaints, protests, and matters of an ethical nature. When such complaints, protests, etc., concern an individual's relations with his local or state society, they shall be considered by this council only after the same shall have been referred to the constituent society concerned, or on an appeal from such constituent society. Its decisions shall be subject to appeal to the House of Delegates.

SEC. 5—*Committee on Dental Education.* The Committee on Dental Education shall

consist of five members. One member shall be elected to serve one year, one for two years, one for three years, one for four years, and one for five years. Thereafter one member shall be elected each year to serve five years. The committee shall organize, shall elect a chairman and secretary, and shall adopt such regulations for the government of its actions as it may deem expedient. It shall expend money or contract financial obligations only as shall be authorized in writing by the Board of Trustees. The functions of the Committee on Dental Education shall be: (1) To make an annual report to the House of Delegates on the existing conditions of dental education in the United States. (2) To make suggestions as to the means and methods by which the National Dental Association may best influence favorably dental education. (3) To act as the agent of the National Dental Association under instructions of the House of Delegates, in its efforts to elevate the standards of dental education.

SEC. 6—*Committee on Dental Legislation.* The Committee on Dental Legislation shall consist of five members. One member shall be elected for one year, one for two years, one for three years, one for four years, and one for five years. Thereafter one member shall be elected each year to serve for five years. The committee shall organize, shall elect a chairman and secretary, and shall adopt such regulations for the government of its actions as it may deem expedient. It shall expend money or contract financial obligations only as shall be authorized in writing by the Board of Trustees. This committee shall have the authority to appoint a subcommittee, consisting of one member from each constituent society, and shall have the power to co-operate with the officers of the state and local societies, and with the chief officers of the United States army and navy in regard to legislation affecting the welfare of dentistry. The Committee on Dental Legislation shall report to the House of Delegates at each annual session its proceedings during the previous year, and shall recommend such action in respect to pending legislation as it shall deem proper.

SEC. 7—*Committee on Transportation and Place of Sessions.* The Committee on Transportation and Place of Sessions shall consist of five members. The chairman shall be elected to serve for three years; the other four members shall be appointed by the president annually, one of whom shall reside in the place chosen for the next annual session. Invitation for the association to convene in any city or place shall be presented to this committee, whose duty it shall be to recommend to the House of Delegates the places available for an annual session, with advantages and disadvantages of each. The committee shall secure railroad rates for the annual session, and shall publish same in the Journal of the National Dental Association, and other journals, at the earliest possible time prior to the date of the annual session.

SEC. 8—*Reports of standing committees.* The reports of standing committees shall, as far as possible, be transmitted to the general secretary ten days before the date of the annual session, and he shall have them printed for distribution to members of the House of Delegates at the first meeting of the annual session.

SEC. 9—*Reference Committees.* (a) Immediately after the organization of the House of Delegates, at each annual session, the president shall appoint from among its members such committees as may be deemed expedient by the House of Delegates. Each committee shall consist of three members unless otherwise provided, the chairman to be specified by the president. The members of these committees shall serve during the session at which they are appointed.

(b) To the appropriate committee shall be referred resolutions, measures, and propositions presented to the House of Delegates before final action shall be taken, unless otherwise unanimously ordered by the House of Delegates.

(c) Each reference committee shall, as soon as possible after the adjournment of each meeting, or during the meeting, if necessary, take up and consider such business as may have been referred to it, and shall report on the same at the next meeting, or when called on to do so.

(d) The following reference committees are hereby provided:

1. A Committee on Sections and Section Work, to which shall be referred all business relating to the sections.

2. A Committee on Rules and Order of Business, to which shall be referred all matters regarding rules governing the action, methods of procedure and order of business of the House of Delegates.

3. A Committee on Dental Education, to which shall be referred all matters relating to dental colleges and dental education. The members of the standing Committee on Dental Education shall be *ex officio* members of this reference committee.

4. A Committee on Legislation, to which

shall be referred all matters relating to state and national legislation. The members of the standing Committee on Dental Legislation shall be *ex officio* members of this reference committee.

5. A Committee on Amendments to the Constitution and By-laws, to which shall be referred all business relating to this subject.

6. A Committee on Reports of Officers, to which shall be referred the president's address and the secretary's and trustees' reports.

7. A Committee on Credentials, to which shall be referred all questions regarding the registration and the credentials of delegates.

8. A Committee on Miscellaneous Business, to which shall be referred all business not otherwise disposed of.

BOOK IV.

CHAPTER XII—*General Meetings.*

SECTION 1—*Time of general meetings.* The general meetings shall be held at 10.30 A.M. and at 8 P.M. of the first day of the annual session, and at 8 P.M. of the subsequent days.

SEC. 2—*Addresses.* At the first general meeting shall be delivered the address of the president, whose recommendations shall thereupon go to the House of Delegates for action. The balance of the time of the first meeting shall be devoted to such other addresses as may be provided. The first evening meeting shall be devoted to a paper recommended by Section I, the second evening meeting to a paper recommended by Section II, and the third evening meeting to a paper recommended by Section III.

SEC. 3—*Order of business.* The order of the first general meeting shall be as follows:

1. Calling the meeting to order.
2. Prayer.
3. Address of welcome and response.
4. Report of Committee of Arrangements.
5. President's annual address.
6. Literary program.
7. Adjournment.

CHAPTER XIII—*Sections.*

SECTION 1—*Meetings.* Each section shall hold its first meeting at 2 P.M. of the first day of the annual session, and on each subsequent day at 9 A.M., until the program is completed or as the section may decide; provided that a section shall hold no meeting that will conflict with a general meeting. The State Society Officers' Section shall hold its first meeting at 2 P.M. on the first day of the annual session.

SEC. 2—*Officers of sections.* The officers of each section shall consist of a chairman, vice-chairman, and a secretary. These shall serve for one year, or until their successors are elected and qualify; provided that each section may elect its secretary to serve a longer time at its discretion. Each section, except the State Society Officers' Section, shall also elect annually one representative and an alternate to the House of Delegates of the National Dental Association, to serve for one year.

SEC. 3—*Election of officers.* The election of officers of each section shall be the first order of business of the morning meeting of the last day of each annual session.

SEC. 4—*Duties of section officers.* (a) Each chairman shall perform the usual duties of such office, and shall co-operate with the section secretary in procuring papers and in the arrangement of the program for his section. (b) Each vice-chairman shall assist his chairman, and take his place when necessary. (c) Each secretary shall keep the records of the section in a book provided for such purpose; shall, with the co-operation of the chairman, conduct all correspondence necessary to secure papers and perfect the program for his section; and he shall forward to the general secretary, at least forty days prior to the date of the annual session, a copy of his section program for insertion in the official program, and shall perform all other duties pertaining to the office of secretary.

SEC. 5—*Executive Committee.* Each section shall have an Executive Committee, which shall consist of the last three retired chairmen. In the absence of a member of this committee the acting chairman shall sit in his stead. At the first organization of each section, in 1913, an Executive Committee of three shall be elected, one to serve for one year, one for two years, and one for three years, by which time the Executive Committee will be constituted as above provided. The Executive Committee shall examine and pass on all papers read before the section, and shall indorse for publication only those that are of scientific or of practical value; it shall also examine all papers offered to the section prior to the reading thereof, and shall, except in the case of the State Society Officers' Section, choose the one to be read before the general meeting devoted to the work of its particular section, and such paper shall not be read before the section meeting.

SEC. 6—*Honorary and Associate members.* Each section, except the State Society Officers'

Section, at its opening meeting may make nominations for honorary and for associate members, in accordance with Sections 2 and 3 of Chapter III. The secretary shall immediately notify the general secretary of such nominations.

CHAPTER XIV—*Papers, and Discussions.*

SECTION 1. Titles and abstracts of papers offered to sections must be in the hands of the section secretary at least forty-five days prior to the annual session.

SEC. 2. The time allowed for the presentation of a paper before a section shall be limited to thirty minutes, except by unanimous consent. No one shall address a section more than once on the same subject, nor for longer than five minutes, except with the consent of the majority of those present.

SEC. 3. Each section may provide by-laws for its own government, provided the same do not conflict with the Constitution and By-laws of the association.

CHAPTER XV—*Publication.*

SECTION 1. No paper shall be published as having been read before a section unless it has received the approval of the Executive Committee of said section.

SEC. 2. Each author shall hand his manuscript to the section secretary immediately after the reading thereof, and such manuscript must be ready for publication at that time, and must be accompanied by copy for all illustrations needed. The secretary shall indorse thereon that it has been read, and shall hand it to the Executive Committee for its action. All papers approved by the Executive Committee shall be returned to the section secretary, who shall at once forward them for publication to the editor of the Journal.

SEC. 3. No paper shall be published as having been read before a section unless it has actually been read, or unless, for special reasons, when the author has been present and prepared to read the paper, the section shall vote to have it read by title.

SEC. 4. All papers and reports presented to a section, and approved by the Executive Committee, shall become the exclusive property of the association, provided that the Board of Trustees may permit an author to publish his paper elsewhere than in the Journal of the National Dental Association.

SEC. 5—*Official resolutions approved by the House of Delegates.* No memorial, resolution, or opinion of any character whatever shall be issued in the name of the National Dental Association, unless it shall have been approved by the House of Delegates.

BOOK V—AMENDMENTS.

CHAPTER XVI—*Articles of Incorporation.*

SECTION 1. The House of Delegates at any annual session, wherever the same may be held, may instruct the Board of Trustees to make any changes in the articles of incorporation in accordance with the law, which may appear desirable, or which may be made necessary by any change or amendment to the Constitution and By-laws of this association.

SEC. 2. These By-laws may be amended on a two-thirds vote of the House of Delegates, provided that no amendment shall be acted on till the day following that on which it is introduced; except that the Board of Trustees may by unanimous vote make such changes, and such changes only, as may be required to adapt them to the rules and regulations of the United States postal authorities.

Code of Ethics.

ARTICLE I.

THE DUTIES OF THE PROFESSION TO THEIR PATIENTS.

SECTION 1. The dentist should be ever ready to respond to the wants of his patrons, and should fully recognize the obligations involved in the discharge of his duties toward them. As they are in most cases unable to correctly estimate the character of his operations, his own sense of right must guarantee faithfulness in their performance. His manner should be firm, yet kind and sympathizing, so as to gain the respect and confidence of his patients, and even the simplest case committed to his care should receive that attention which is due to operations performed on living, sensitive tissue.

SEC. 2. It is not to be expected that the patient will possess a very extended or a very accurate knowledge of professional matters. The dentist sbould make due allowance for this, patiently explaining many things wbich may seem quite clear to himself, thus endeavoring to educate tbe public mind so that it will properly appreciate tbe beneficent efforts of our profession. He should encourage no false hopes by promising success when, in tbe nature of the case, there is uncertainty.

SEC. 3. The dentist should be temperate in all tbings, keeping both mind and body in the best possible health, that his patients may have the benefit of that clearness of judgment and skill wbich is their right.

ARTICLE II.

MAINTAINING PROFESSIONAL CHARACTER.

SECTION 1. A member of the dental profession is bound to maintain its honor, and to labor earnestly to extend its sphere of usefulness. He should avoid everything in language and conduct calculated to dishonor his profession, and should ever manifest a due respect for his brethren. The young should show special respect to their seniors; the aged, special encouragement to their juniors.

SEC. 2. It is unprofessional to resort to public advertisement, cards, handbills, posters, or signs, calling attention to peculiar styles of work, lowness of prices, special modes of operating; or to claim superiority over neighboring practitioners; to publish reports of cases or certificates in the public prints, to circulate or recommend nostrums; or to perform any other similar acts. But nothing in this section shall be so construed as to imply that it is unprofessional for dentists to announce in the public prints, or by cards, simply their names, occupation, and place of business, or in the same manner to announce their removal, absence from, or return to business, or to issue to their patients appointment cards, having a fee bill for professional services tbereon.

SEC. 3. When consulted by the patient of another practitioner the dentist should guard against inquiries or hints disparaging to the family dentist or calculated to weaken the patient's confidence in him; and if the interest of the patient will not be endangered thereby, the case should be temporarily treated, and referred back to the family dentist.

SEC. 4. When general rules sball have been adopted by members of the profession practicing in the same localities in relation to fees, it is unprofessional and dishonorable to depart from those rules, except when variation of circumstances requires it. And it is ever to be regarded as unprofessional to warrant operations as an inducement to patronage.

ARTICLE III.

CONSULTATIONS.

Consultations should be promoted in difficult or protracted cases, as they give rise to

confidence, energy, and broader views in practice. In consultations that courtesy and just dealing which is the right of all should be especially observed.

ARTICLE IV.

THE RELATIVE DUTIES OF DENTISTS AND PHYSICIANS.

Dental surgery is a specialty in medical science. Physicians and dentists should both bear this in mind. The dentist is professionally limited to diseases of the dental organs and adjacent parts. With these he should be more familiar than the general practitioner is expected to be; and while he recognizes the broader knowledge of the physician in regard to diseases of the general system, the latter is under equal obligations to respect his higher attainments in his specialty.

ARTICLE V.

THE MUTUAL DUTIES OF THE PROFESSION AND THE PUBLIC.

Dentists are frequent witnesses, and at the same time the best judges, of the impositions perpetrated by quacks, and it is their duty to enlighten and warn the public in regard to them. For this and many other benefits conferred by the competent and honorable dentist, the profession is entitled to the confidence and respect of the public, who should always discriminate in favor of the true man of science and integrity against the empiric and impostor. The public has no right to tax the time and talents of the profession in examinations, prescriptions, or in any way, without proper remuneration.

SOUTHERN BRANCH.

FIFTEENTH ANNUAL MEETING.

TRANSACTIONS

OF THE

SOUTHERN BRANCH

OF THE

National Dental Association

AT THE

FIFTEENTH ANNUAL MEETING

Old Point Comfort, Va., July 22, 23, and 24, 1913.

N. D. A.—Southern Branch.

OFFICERS.

President—W. A. Dean, Tampa, Fla.
First Vice-president—R. W. Carroll, Beaumont, Texas.
Second Vice-president—M. D. Huff, Atlanta, Ga.
Third Vice-president—T. T. Moore, Jr., Columbia, S. C.
Recording Secretary—Joseph Eby, Atlanta, Ga.
Corresponding Secretary—J. L. Williams, Jacksonville, Fla.
Treasurer—B. D. Brabson, Knoxville, Tenn.

EXECUTIVE COMMITTEE.

V. E. Turner, *Chairman,* Raleigh, N. C.
B. Holly Smith, Baltimore, Md.
A. J. Cottrell, Knoxville, Tenn.
C. L. Alexander, Charlotte, N. C.
N. A. Teague, Augusta, Ga.
J. E. Chace, Ocala, Fla.

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FIFTEENTH ANNUAL MEETING

OF THE

National Dental Association—Southern Branch,

HELD AT

OLD POINT COMFORT, VA., JULY 22, 23, and 24, 1913.

FIRST DAY—Tuesday, July 22d.

THE fifteenth annual meeting of the Southern Branch of the National Dental Association was called to order in the ballroom of the Chamberlin Hotel, Old Point Comfort, Va., at 11.30 o'clock Tuesday morning, July 22d, by the president, Dr. S. W. Foster, Atlanta, Ga.

The meeting was opened with prayer by the Rev. J. T. McGLOTHLIN, Hampton, Va.

The first item on the program was the address of welcome on behalf of Virginia by Dr. GEO. F. KEESEE, Richmond, Va., as follows:

Welcome from Virginia.

Mr. President and gentlemen,—I have been requested on behalf of our state to give you words of welcome to this good old commonwealth. Virginia from time immemorial has been the exponent of hospitality. Dating back to the days of Governor Berkeley, the first governor, we find her then limitless borders dotted over with the brawn and sinew of those who stood for honesty and integrity. Very soon, however, her first governor was recalled for graft, and was succeeded by another, Governor Culpepper. The people of this peninsula soon presented to Attorney-general Seymour a petition for a charter for a college, but was met with the response, "To the winds with your college; go raise more tobacco." Heedless of this, they pressed on their petition, until finally in 1692 was established here within a few miles, at Williamsburg, the first college, known as the College of William and Mary. There have gone forth from her halls those who have graced every avenue of life. Three have been called to occupy the presidential chair in the White House. While all this was being done for the mind,

the wiseacres bethought themselves of the necessity of fortifying the rich fields of this goodly land, and there was erected within a few yards from here yon frowning fortress, bidding defiance to all who would dare come as intruders and molesters. Those high columbiads have been replaced with truly disappearing guns, and instead of the shriek of shot and shell, there is only heard the salute of "Welcome."

Virginia has been abreast of the time and kept pace with the onward step, ever on the alert. She has prepared in every avenue to enable all who have Excelsior in view, the way to obtain the goal. Her schools have been endowed, and teachers from every clime have been called to give guidance and direction to willing minds. Her colleges for every profession stand with open doors, inviting students to sit at the feet of their Gamaliels. Particularly is this the case in the medical and dental professions. Professors who in former days gathered their robes around them and sat in the high places, now condescend to come from off their pedestals and mingle with the students in the analysis, and delve with them in the study of biology, and upward through all the various stages.

What was previously shrouded in mystery is today made plain, so that the wayfaring man, though a fool, may read. And he who gloried in the hidden depths of medical lore, and taught that such diseases as dyspepsia were beyond the comprehension of the average man, now teaches that it is simply the failure to adapt a square meal to a round stomach.

Today I stand a connecting link in the great chain of dentistry of the past, grasping hands as I have done with Atkinson, Morgan, Taft, Webb, Thompson, Woodley, Thackston, Moore, Gingrich, and a host of others equally as bright, with you of today, from your honored president down to the humblest member of our profession.

I have seen the days of the molar files and the turnkey, when something had to come, jawbone or tooth; the days of soft gold and the ounce mallet; the days when Josiah Bacon held high carnival, exacting his royalty, ranging from two to three and four hundred dollars per year for sets of teeth on vulcanite. Time sped on, and what de wo find today? Electrical appliances of every description, ranging from the fan for cooling the perspiring brows of the patient and operator, to the electrical lamp for detecting the most inaccessible cavities, giving us the sweet assurance that we found them even if we cannot fill them.

Upon Virginia's professional grounds we find all that we can at present hope for, and with exultant desires we are looking forward to the day when we can vie with our sister city of New York. Who can say but that just such things may come to pass here? For surely the foolish things are made to confound the wise.

Virginia with a loving heart and outstretched arms welcomes you who have come in pursuit of knowledge. I have endeavored to show you that you have come to no place of laggards, but we greet you as a great state of progressives, and invite you to the hospitality of all that is known as Southern dentistry, hoping that your stay may be one of pleasure as well as professional profit.

What more can I say than simply to deliver you into the hands of the head waiter, with the wish that the boy's grace—"Good Lord, have mercy on these victuals!"—may ascend from every devout heart.

Dr. W. H. Ewald, Norfolk, Va., on behalf of the Virginia State Dental Society, welcomed the association as follows:

Welcome from Virginia State Dental Society.

Mr. President and members of the Southern Branch of the National Dental Association,—This most honored position which was given me by the members of the Virginia State Dental Society enables me to try to perform in my feeble way a most pleasant duty. I assure them that I feel my total inability to even do that duty in any way fitting for the occasion.

I feel forced to make an apology to them for an incapability to express a sentiment that I am sure fills every Virginian's heart.

Gentlemen of the Southern Branch, we are happy to have you with us again. As you know. Virginia is your mother state. Georgia is your birthplace; after twenty-eight years of a most splendid record as the Southern Dental Association, you were reborn on this historic spot sixteen years ago as the Southern Branch of the National Dental Association. In these sixteen years that grim reaper, death, has plucked from your ranks a great many of the noblest men in any age. Would that we could this day greet Crawford, Friedrichs, Arrington, Thackston, Woodley, Moore, Parramore, and many others who

> Sleep beneath the shadow of the clouds;
> Careless alike of sunshine or of storm,
> Each in the windowless palace of rest.

I feel with their passing there is greatly missed that unselfish, sacrificing, manly spirit that is at the foundation and the upbuilding of this great lifework of ours.

We, however, feel that "they beckon us, knowing that there is no retreating, and so we know that there are no dead left behind; that in the measure that we have loved them, and they have loved us, they are with us still, strengthening our hearts in dreams and in secret musings. They have taught us to accomplish work that will survive unchanged and beautiful when time shall have withered the garland of youth, when thrones of power and monuments of art shall have crumbled into ashes." May we ever be able to perpetuate and keep always before us the memories of such noble men.

I understand there is a possibility of the disbanding of your body. I feel sure it is after long study and deliberation, and let us trust that we may never have an occasion to act in any way that would reflect on the work so perfectly done by our forefathers in bringing us to our present stage of advancement.

Friends, we Virginians are going to do our utmost to make you have a good time. We in turn will share your pleasure, and at the same time we are to reap many benefits in having had you with us.

Pardon our "ego," but we believe that he who cannot enjoy a few days at Old Point is a subject for consultation. What you don't see, ask for, as it will be a privilege to provide it, if possible.

The Virginia State Dental Society quotes Milton, and heartily says:

> Thus we salute thee, with our early song,
> And welcome thee, and wish thee long.

Dr. B. Holly Smith, Baltimore, Md., responded to the addresses of welcome on behalf of the association, as follows:

Response to the Addresses of Welcome.

There is nothing more grateful than a welcome. The human heart is melted with appreciation and love in its presence. The newspapers tell us that on the occasion of the visit of the president of France to London, when he found that in addition to the cordial greetings of royalty the populace lined the streets, and with shouts and waving hats gave him a glad welcome, he bowed his head and wept tears of thankfulness. As we come to receive your greeting, I for one, at least, cannot refrain from some sentimental reflection. I do not forget that we are on Virginia's sacred soil. I have lived long enough within the boundaries of this commonwealth to know and love her people, to find a distinct and characteristic quality in them which is more than attractive. I am not unfamiliar with the important part taken by the great men of this state in giving life and vigor to this nation of which we are so justly proud; and in the name of this association I thank you for your welcome to this soil, these people, and their sacred memories.

Borne in upon me on this occasion also is the recollection of the lives and work of the men with whom we joined hands in this place in professional accomplishment of vast importance to our calling, but who are not here today with their eloquent words and loyal acts. Such men as Thackston, Staples, Arrington, Crawford, Chapple, Hunter, Atkinson, Dwinelle, Fillebrown, Winder, and many many other stalwart men who carried the logs and placed the masonry with which were builded professional organizations such as ours. We shall miss their advice and companionship, but may we not renew here and now our vows of loyalty to the cause to which they devoted their lives? May we not borrow from the past some of the gentle sweetness and love which characterized those lives? May we not employ in our deliberations and discussions some of the old-fashioned courtliness and politeness which they used? With this hope I again thank you most heartily.

The next item on the program was the address of the President: Dr. V. E. Turner occupied the chair while the president, Dr. S. W. Foster, Atlanta, Ga., read his annual address. [See next page.]

PRESIDENT'S ADDRESS.

By S. W. FOSTER, D.D.S., Atlanta, Ga.

Ladies and Gentlemen,—I will not deny, indeed I must confess, as I stand before you today as your presiding officer, occupying the highest position of honor within the gift of this distinguished body, that I esteem this as a proud moment of my existence. While I have fully appreciated this honor and accepted it most graciously, I have not disregarded the importance of the responsibilities associated with its acceptance, and I have felt more keenly than I can express, my lack of ability to measure up to the full requirements of the occasion, or the modest expectations of my friends.

In my endeavor to discharge the important functions of presiding officer, I feel that I have your generous sympathy and your earnest fraternal support. This gathering of members of the dental profession from all parts of this Southland is sufficient proof that we are not here for an idle purpose, but that our coming denotes an earnest endeavor that through this social intercourse and interchange of ideas we may grow into a closer fraternal union, and acquire a better appreciation of the significant relationship which the profession of dentistry sustains toward the physical and mental development as well as the longevity of the human family. This thought should be a hopeful stimulation, and encourage us to enter earnestly into the discussion of all subjects which affect the interests of dentistry. I am sure that the ultimate good that will result from the deliberations of this body at this time will be as far-reaching in its influence as has been the case in the past.

More than two years ago the last official meeting of the Southern Branch was held in Atlanta, on April 1, 1911. It appears to the writer that no similar period during the history of the dental profession has been so progressive in logical research or scientific practice as the one elapsed since our last meeting. During this time, various forms of constitutional infection have been conclusively traced directly to oral infection. We have learned that it is possible, indeed that it may not be the exception, that certain forms of nephritis, rheumatism, dyspepsia, pernicious anemia, tuberculosis, and many other disorders are absolutely dependent upon mouth infection. The value of oral prophylaxis as a means of preventing disease and increasing the efficiency of the individual has been most clearly proved.

It has been shown that orthodontia,

as a science, has a decided influence upon certain forms of biology and physiology, and we could continue to enumerate, but will not encroach upon the time of this society.

I feel that, as we come together this morning and receive the happy greetings of old friends, as well as have the pleasure of meeting new ones, we, as representatives of the dental profession, have much to encourage and stimulate us to higher effort. I am sure that I am voicing the sentiment of all present when I say that after two years' absence we come together with increased loyalty to this grand old organization, the aims and purposes of which have at all times stood for that which is highest and noblest in dentistry, and around which cluster many cherished friendships and social pleasures, as well as a full knowledge of the value of the information gained in our annual meetings.

While, I repeat, we have much to congratulate ourselves upon in the progress our profession is making, yet we are forced to confess that the profession as a whole is indebted to the individual efforts of a few for its true advancement. If I were to offer an adverse criticism of our profession today, I would mention first the lack of studious progressive individual effort on the part of a majority of its members.

Many fail to realize the value of individual worth, and are content to encourage a too prevalent idea that power and influence is only given to a select few, when, as a fact, it is given to every individual who puts forth the effort. There is a spirit of indifference, virtually reaching a state of apathy, at all times pervading our profession, which influence has a greater tendency toward impeding progress than giving it impetus.

Much has been written, and many means and ways have been suggested for increasing our attendance at annual meetings, yet there still remains an indifference, and we have only a comparatively few where we should have thousands coming to these meetings. It is a noticeable fact, further, that our society meetings are led by a few of those present, and it is mostly through these few, and through their work, that we have made progress.

If we may expect success, individually, professionally, or as an association, we must be willing to make an individual and united effort. That success which is of true value can only come to us through sacrifice, through self-denial, through mental and physical concentrated effort. The individual professional life is indicative of what the professional whole is, just as it has been said that—"The life of an individual is a miniature of the life of a nation."

Let us hope that every individual present will realize that he has an obligation to use whatever power he may possess in the interest of professional progress, and that we may enter into the deliberations of these meetings with enthusiasm born of success and with the hope that at our next annual meeting we may be permitted to register greater scientific progress than ever before.

I cannot close without reference to and commendation of the work being done under the auspices of local dental societies in oral hygiene and dental inspection in some of the public schools of our country. I know of no better method of reaching the masses and educating the public regarding the beneficent influence of good dental service.

I offer no suggestions or recommendations for the deliberation of this body, save one—and I approach this subject somewhat hesitatingly, and with a measure of sadness—that is, the consideration of the advisability of continuing this branch association of the National Dental Association.

When, fifteen years ago, the American Dental Association met in convention in this hotel, and the Southern Dental Association was holding its meeting at the old Hygiea Hotel, then across the street, it was deemed wise and in the interest of progress that we combine the two associations, and form the National Dental Association, with the privilege and understanding that subordinate branches were to be formed, viz, a Southern, Western, and Eastern Branch. The Old Southern Dental Association, which was organized in 1869 in Atlanta, after a call sent out by the lamented Dr. Wm. H. Morgan of Nashville, despite the protest of some of its members at that time, relinquished its charter, and, in keeping with the understanding reached with the American Dental Association, organized the Southern Branch. Opposition to the branches soon developed, and as a consequence no others were organized, and many of our members are of the opinion that this Southern Branch should not be continued any longer, claiming as one of their reasons that the irregular meeting periods cause the members to lose interest, also that a necessity for the branch does not now exist, etc.

Your Executive Committee sent out communications and requested a postal-card vote some months ago, endeavoring to ascertain the consensus of opinions on this point. The result was a fairly divided vote, as I understand. Your active officers have found great difficulty in securing co-operation and favorable responses to appointments on committee work, many members declining to accept, for the reason that they did not longer favor continuing the branch. For these and other reasons, I consider it absolutely imperative that we at this time settle this matter definitely. If we are to continue the branch, I hope that adverse criticism will cease, and that we may work unanimously for such success in the future as has characterized this society since its first organization in 1869. Otherwise it seems inevitable that we must cease as a branch society.

Since the last roll-call some of our members have ended their labors, and have gone to "that bourne from which no traveler returns." Some of our best members have been taken, men who have grown gray in service. As they have lain down worn out, let others stand ready to accept the trusts they have left us, and remember that time is passing, and after we have gone, all that deserve to live are good thoughts and noble deeds.

The names which I have before me are Drs. L. D. Carpenter, Atlanta, Ga.; T. M. Allen, Tampa, Fla.; P. H. Wright, Oxford, Miss.; Louis D. Archinard, New Orleans, La.; J. A. Hall, Collinsville, Ala.; George H. Tigner, Atlanta, Ga.

I suggest that we have a committee on necrology appointed who will report on our deceased brethren, and that suitable memorials be offered.

Again thanking you for the honor you have conferred on me, and with expressions of appreciation for these cordial greetings extended, and personally thanking the members of the Virginia Society for the co-operation and assistance rendered, I conclude by asking your

assistance and patience while I am your presiding officer.

Dr. B. Holly Smith, Baltimore, Md. I move that a committee of three be appointed by the chair to report on the President's address, and to make suitable recommendations thereon. [Motion carried.]

The following gentlemen were appointed as a committee to report on the President's address: Dr. B. Holly Smith, Dr. T. T. Moore, and Dr. R. W. Carroll.

The President then resumed the chair.

Dr. Turner, chairman of the Executive Committee, then offered the program for the next session.

The meeting then adjourned until the afternoon session.

TUESDAY—Afternoon Session.

The meeting was called to order Tuesday afternoon at 3 o'clock by the president, Dr. Foster.

The first order of business was the paper by Dr. J. A. Cameron Hoggan, Richmond, Va., entitled "Nasal Space and the Dentist's Responsibility," as follows:

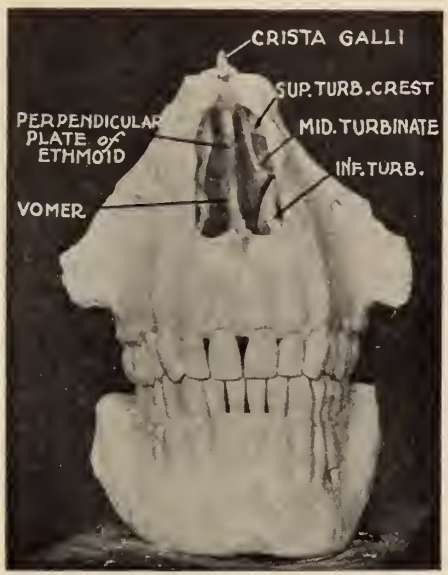
Nasal Space and the Dentist's Responsibility.

By Dr. J. A. CAMERON HOGGAN, Richmond, Va.

The recognition of the true value of each card in a whist hand and a rapidly formed calculation of the value of the hand as a whole, is the secret of good whist; it means a mental picture of the hand as soon as the player takes up the cards. So it is with the study of the internal face. The relation of the bones is so complex that probably very few students of anatomy successfully get an accurate mental picture of the value, position, and relation of each bone in the skull. No better way exists of forming a correct picture than constructing, with our own hands, a model of the internal face and skull in some plastic material. It should be enlarged on a definite scale, so that we can trace with our hands the anatomical and, to a certain degree, the physiological functions of all the parts.

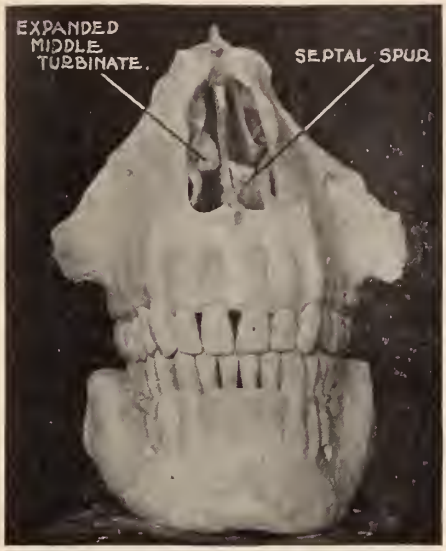
In Fig. 1 are shown, modeled in plaster of Paris, the principal bones of the face concerned in respiration. The upper central incisor of a particular skull was chosen as a type, and the model enlarged fifty times its size. The remaining twenty-seven teeth were carved to harmonize with this one tooth, and occluded normally, plaster of Paris being used to hold them in position. The mandible, as shown, was then

FIG. 1.



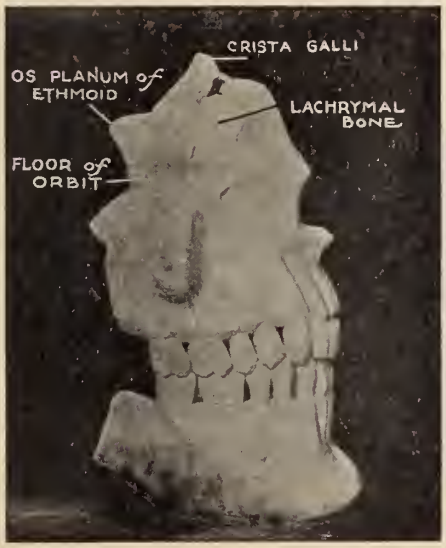
Anterior aspect, showing clear meati and the relation of normal occlusion to the bones of the face. (Model was 50 times normal size.)

FIG. 2.



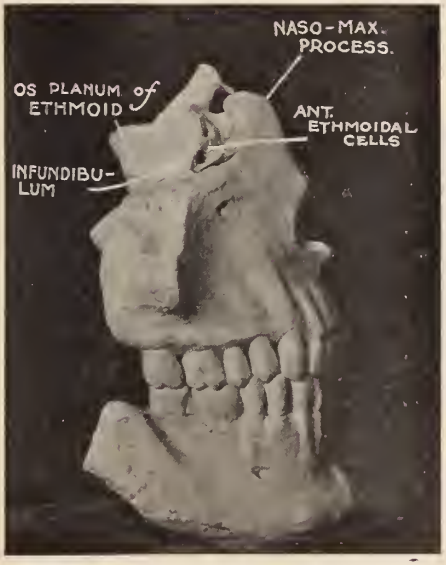
Anterior aspect showing nasal obstructions.

FIG. 3.



Showing balance of normal occlusion and lacrymal bone *in situ*.

FIG. 4.



With lacrymal bone removed, showing anterior ethmoidal cells.

formed in proportion to the lower teeth. The maxillary bones were next added, followed by the vomer, turbinates, lacrymal, and ethmoid bones, all in harmony and disarticulated.

The beauty of normal occlusion and the dependence of the bones named upon normal occlusion is clearly demonstrated.

Fig. 5.

Ethmoid bone raised from seat of articulation, showing the manner in which the unciform process comes down to meet the ethmoid process of the inferior turbinate to complete the outer wall of the nasal fossæ and the inner wall of the antrum.

Fig. 6.

Showing posterior view of nasal space, right lateral mass divided into posterior ethmoidal cells, and left lateral mass undivided.

In association with malocclusion and undeveloped jaws we usually find abnormally formed bones in the internal nose. Let us place in this fully developed nasal

Fig. 7.

Showing cusp planes of occlusion.

Fig. 8.

Showing mandible as far as rami.

space an enlarged middle turbinate, a septal spur, and a spur on the inferior turbinate, and we perceive how greatly the normal channel for respiration is decreased in size. If we assume further a chronic inflammation of the mucous membrane, hypertrophic rhinitis, adenoid tissue, or any of the pathological conditions of the membranous lining of the internal nose or naso-pharynx, and add again to these conditions an undeveloped nasal space, we obtain a good picture of the breathing apparatus of a child with a contracted upper arch.

I have seen occasionally undeveloped jaws with comparatively clear meati, and I have seen a dentist extract teeth with a clear conscience, but I have yet to see normal occlusion keeping company with a deformed nose. Orthodontia divides humanity into two great classes—those with normal occlusion and those without. When Angle gave to dentistry the orthodontia of normal occlusion, man made one great stride toward future perfection.

A PICTURE OF THE TYPICAL MOUTH-BREATHER.

Let us consider briefly a hypothetical case. A young mouth-breather of fifteen years of age is just out of school. He comes panting home to dinner a little behind the others. He is not strong, and there is a dull, sullen anger in his eye; to him, this has been a bad morning. It is of no use, he cannot get along at school; with memory dull, eyes weak, hearing poor, he cannot study. Is it strange that he rebels, and looks with anxious, envious eye at the seat on the butcher's cart? This chill November day, as he runs along, a passing streetcar raises a cloud of dusty filth; he tries to avoid it, but the short, sharp gasps come so frequently that he cannot save himself, and he lines his mouth, throat, and lungs with a nice coating of this dusty filth. Of course it is not any worse than any other city dust; it merely comes from the road, the place in which we are asked to expectorate.

On his arrival home, his mother, seeing the pale, anemic face of her boy, thinks he does not look strong. He is thin, he should have more meat, and she gives him a large portion of the steak; but with nose blocked, sense of smell gone, he cannot taste it, cannot enjoy it, so he must have more condiments and pickles. These he is given. He eats quickly, does not seem to relish his meal, indigestion ensues, and constipation results.

The chill, discouraging days of autumn; the slow, insidious cough of winter; the long-delayed visits to the physician; removal of the adenoids or the operation of tonsillotomy—are the natural sequence of events in the next six months. Now comes the assurance from the physician that the boy will get well, *but*—and here the physician pauses—he must give up the habit of breathing through his mouth—he must learn to keep his mouth closed; and the boy is launched forth with stimulated hope, with a cleaned, clear nasal passage—but to struggle in a hopeless fight. It is a physiological impossibility for that boy to keep his mouth closed over his teeth.

It is a recognized fact that rhinology today looks to dentistry for aid in establishing normal breathing. By stimulating the growth of the bones and widening the upper arch, the floor of the nose is enlarged. The meati are enlarged, septal curvatures are modified, and restored function encourages growth of the

nose. We who are custodians of the mouth are also responsible for the condition of the nose. It is self-evident, therefore, that we should guard against the formation of spurs, enlarged turbinates, and pathological conditions, by bringing about normal occlusion as soon as feasible, instead of waiting until the full complement of teeth erupt. This is a question that has to be discussed with almost every patient who presents himself to the orthodontist. Mistaken impressions on the part of the patient are bound to occur if there are conflicting opinions between the dentist and the orthodontist in regard to age.

Thus orthodontia has broadened the field of dentistry, and has greatly contributed to human health and happiness —which should be gratefully acknowledged.

Discussion.

Dr. Pearson. I appreciate the amount of work which Dr. Hoggan has done in the preparation of the model he has shown us. This is a subject worthy of thought in every case that we are called upon to treat. Of course we know that all bone grows by stimulation, and we should produce only normal stimulation. We know that one of the first organs to be formed is the tongue, and the cranium is formed around that. Dr. Cryer has laid great stress on the part which the tongue plays in the development of the arch of the mouth. I had the pleasure last year of hearing him speak on the subject of broadening the arch and trying to separate the suture, which he pronounced to be absolutely impossible. A great deal is being said on this subject at the present time, but I think Dr. Cryer has proved that it is impossible, and at a clinic in Philadelphia he showed skulls to prove his contention. Of course, when an examination is made by X-ray photographs there seems to be an opening there, but he showed a number of X rays made in such cases thus treated which showed no separation at all. As Dr. Hoggan said, the way in which the breathing space is increased is by the lowering of the palatal arch. That naturally straightens the septum, and the breathing space is only so much in proportion to the arch. If the arch is normal, the breathing space is bound to be normal.

Dr. C. L. Alexander, Charlotte, N. C. I would like to ask the essayist whether he thinks that often the extraction of the first molars causes a deflection of the septum. A patient of mine in whom the molars were extracted recently had some trouble with breathing, and had to have an operation performed; the septum was taken out in order to secure breathing space, and I feel confident that the extraction of the first molars was the cause of this patient's trouble.

Dr. M. D. Huff, Atlanta, Ga. I have been very much interested in the lecture and in the model, which were both perfect.

I have seen the breathing-space increased by the application of plates or suture-openers, so called, in the regulation of teeth, and I know it is possible to increase the space in the nares, because it is being done all the time, and that it is one of the best services we can render a suffering public. The essayist is to be commended for his work.

Dr. I. N. Carr, Durham, N. C. When discussing the subject of what constitutes an absolutely normal face, and the bones that form the bony frame of the face, most of us, having forgotten a

great deal of anatomy, cannot do justice to the subject. But we all approve of practical orthodontia. We know that, by pressure, absorption of bone or any other tissue is produced, and it has always been a question in my mind whether or not it is always practical to expand the arch in regulating teeth; I doubt it very seriously myself. I know that in some cases it is practical, but probably not in others. Extraction of teeth, in my opinion, will often save a child a great deal of nervous strain, and the operator a great deal of trouble and annoyance, and in many cases, therefore, is a more practical way of regulating teeth. If the arch does not develop with sufficient rapidity to accommodate the number of teeth, then we must make room for them in some way, rather than sacrifice the child's nervous system under the continuous strain of gradually applied pressure. I believe it is often a mistake not to extract the first bicuspid, for instance, when all the other teeth are in perfect occlusion. I know that many orthodontists disagree with me, thinking that teeth should never be extracted. I think they are carrying a principle too far. When the lower jaw is so broad as to fail in occlusion with the upper teeth, the upper jaw should be expanded to accommodate the lower, thereby producing perfect occlusion of all the teeth. This, to my mind, is more important than changing the facial expression, since utility and comfort go before esthetic appearance.

Dr. J. S. Spurgeon, Hillsboro, N. C. I did not expect to speak on this subject, but I must rise to express my disapproval of what Dr. Carr has said in regard to extracting teeth. But before doing so I wish to express my commendation and appreciation of this splendid model and the lucid description that Dr. Hoggan has given of it.

This model shows beautifully the construction of the bones, also that a little pressure exerted at the right time and in the right direction will not only move the teeth, but will change the whole arch so as to produce a normal contour of the face. The occlusion will become a natural one, seemingly without effort.

The essayist has shown clearly and beautifully how the laws governing the development of the face may be assisted by a little timely interference.

One of the greatest mistakes made by many of us who are only doing a little in orthodontia and who have not availed ourselves of the latest and most valuable methods, is that we use too much pressure and very often do not apply it in the right direction. With a little pressure in the right direction, the occlusion will become normal, the arch will expand, and the face will change accordingly, assuring its proper contour.

This model shows clearly and plainly how these results are accomplished if we can only inaugurate treatment at the right time and in the right way, and use the proper amount of pressure.

The orthodontists, whom Dr. Hoggan "represents," deserve the greatest honor and our unstinted support for their deep insight into the laws of nature as applied to the development of the bones of the face.

I believe that the time is coming and is not far distant when we shall know the laws of nature as applied to our whole physical being so well that sickness and pain will be a thing of the past. Why should a man be sick, if all the organs and glands of the body are performing their proper functions? Why should we have auto-intoxication,

if all the glands are giving off the proper amount of secretions? Why should they not always produce the proper amount of secretion? There seems to be but one reason; that is, they have been overtaxed, either from the amount or the quality of the work they have had to do, and this was caused either by the quantity or quality of the food or the drinks ingested.

The time is coming when we shall know our physical organization so well that violating it will mean admitting our ignorance and wilful disobedience, and acknowledging that we are sick will be a reflection on our intelligence.

In regard to Dr. Carr's remarks, I would say that those of us who have gone over the principles of orthodontia as laid down by those two eminent teachers, Angle and Jackson, should not admit that teeth should be extracted for the correction of irregularities. There may be one case in a thousand when a bicuspid or first molar should be extracted—though even then I would not do it: "The normal development and contour of the face require that all the teeth should be left in the arch."

The trouble with many of us is that, when we think that teeth should be extracted, we do not take into consideration the age of the patient and the size of the teeth, and forget that the teeth are as large as they will ever be, and that the face will continue to develop and grow for several years. We do not allow our imagination to run far enough ahead to the conditions which will prevail when the child is fully grown. At the age when children are usually brought to us, the face is not nearly so large as it will be, therefore it looks as though there were a protrusion which could not be overcome without the extraction of one or more teeth, and yet, if we will wait a few years, the face will shape up properly, and we will realize what a mistake it would have been to have removed any of the teeth.

When Dr. Carr, Dr. Alexander, myself, and many others present were in college, the straightening of teeth, as it was then called, was simply a matter of individuality. We were taught the manner of construction of some kind of appliance for the correction of a particular case, losing sight of the principles involved. At that time we thought we were justified in removing one or more teeth, as long as we could facilitate the straightening process; but time has proved what a great mistake we made. In every case where I have extracted teeth for the correction of an irregularity it became evident later that I had made a mistake.

Some years ago, in 1905, at our state society meeting, Dr. J. A. Gorman of New Orleans, and myself, presented papers on orthodontia, he taking the position that no teeth should be extracted, and I the opposite. I presented a number of models and photographs of cases where I had removed the first bicuspids, and had succeeded in getting good occlusion, the features of the face seeming perfect. It appeared quite certain that I had accomplished all that could be desired, and in a much easier way than if I had preserved all the teeth and had expanded the arch.

I thought I had proved conclusively to everybody present that I was right, and Dr. Gorman was wrong; but I did not take into consideration that these patients were children. I did not see what was going to happen in the next few years.

In less than two years, as the faces

of these children developed, it became more and more clear that I had made a mistake. So I wrote Dr. Gorman a letter of apology and commendation for the lesson which he had forced upon me, and that lesson to me has been worth more than all the books I had read on the subject up to that time.

At the time these models and photographs were made, the children were from ten to fifteen years of age, their occlusions and facial contours were good, and appearances were all that could be desired. Now it pains me to look at them; the maxilla has failed to develop, the chin falls in, and the faces, otherwise beautiful, are disfigured for life. Dr. Alexander can bear me out in what I say, and perhaps feels the results of these mistakes as keenly as I do.

I therefore would impress on this audience not to extract teeth in children thinking that any benefit will be derived from such extraction in the correction of irregularities.

Dr. S. W. Foster, Atlanta, Ga. I do not want to let this subject pass without giving my expression of appreciation of the matter presented by Dr. Hoggan. In my address this morning I made the statement that within the last few years the science of orthodontia has had a decided influence upon certain forms of biology and physiology of the human family, and the presentation of this model most clearly carries out that suggestion.

Two of the greatest subjects today are orthodontia and oral hygiene. These two subjects have a most important bearing upon the physical and mental development of the human individual. The influence of the proper development of the jaws and nasal passages upon the growing child, as the essayist has pointed out, is most wonderful. What is the effect of closing the middle meati, as the essayist suggested? It means reflex pressure of carbon dioxid upon the lungs and the permeation of this gas throughout the system, causing debility and a lack of proper development. These effects are manifested in many ways. As an illustration I would like to cite an incident that occurred a few weeks ago, when with a distinguished diagnostician I was attending a theater. A number of ballet girls were singing, with their backs turned to the audience; one of these girls had drooped shoulders and an improperly developed spinal column, which I would not have noticed, however. The diagnostician said to me, "When that woman turns around, you will find that she has malocclusion of the jaws, because she has improper development of the thoracic cavity, and her shoulder and spinal column indicate that she has not had sufficient breathing-space to receive proper development." When she turned around, she presented a V-shaped arch, which this gentleman had diagnosed from looking at her back.

I want to impress upon you today the fact that the dental profession as a whole is not as studious and as progressive as it should be. Not that we can all be orthodontists in the full sense of the word, but every one of us should be able to recognize lack of proper physical development and the conditions associated with underdevelopment of the arches and nasal passages, and to direct our *clientèle* into the proper channels. The orthodontia specialist has not been duly considered in the past, but he is coming into his own, and the dental profession and the public are beginning to realize that a malocluded mouth means a lack of proper nutrition, oxygenation, and

development. The reason why more of us have not succeeded in orthodontia is that we have been unable to obtain satisfactory results and collect proper fees, because we have failed to educate the public as to the importance of this department of our profession.

Dr. HOGGAN (closing the discussion). I assure you that I appreciate very much your words of commendation.

In regard to the question of extraction, I think this matter can be best disposed of by placing it in the hands of a committee who may thresh it out among themselves.

But there is something about beauty that is more than skin deep. It means that every line and every structure must be in harmony with the body. There may be proper development of the upper portion of the face, and still that face be entirely disproportionate, owing to the extraction of several teeth. Extraction of the molars shortens the face and alters the size of the inferior meati, because the internal nose is as large as the teeth make it. If teeth are extracted here and there, the size of the jaws is decreased. How many persons' lives are ruined by the consciousness that they are really not as presentable in appearance as some others. Everyone takes a certain pride in the fact that they are normal, presentable, or even good-looking, and some people take exceeding pride in the fact that they are handsome. We have no right to interfere with the conscious enjoyment which a man or woman takes in being normally developed. We are therefore unquestionably assuming too much responsibility in extracting teeth, unless it must be done to relieve pain. I assure Dr. Carr that the movement of teeth must be more or less a physiological process, and that it is without the tedium and pain he speaks of, if carried out correctly. I have many patients in whose mouths orthodontia work has been done without causing the least pain, because the right amount of pressure has been applied at the right time.

Motion was made and carried to adjourn until the evening session.

TUESDAY—Evening Session.

The meeting was called to order at 8.30 o'clock by the president, Dr. Foster.

The first order of business for the evening session was the report of the Committee on Oral Hygiene, by the chairman, Dr. ROBIN ADAIR, Atlanta, Ga., as follows:

REPORT OF ORAL HYGIENE COMMITTEE.

It is with pleasure that the chairman of your Committee on Oral Hygiene reports an increased interest in the subject of hygiene, prophylaxis, and pyorrhea work.

The colleges are nearly all giving a course of lectures on these subjects. The dentists

themselves are doing a large amount of educational work along these lines, by talks at the chair and public lectures before schools and clubs. Various corporations have seen the great advantage of clean mouths in operatives, and the best of all is that the people themselves are awakened to the importance of the subject.

Your chairman has been engaged in active correspondence with many of the dentists most active in this work, for the purpose of collecting material for a book on the subject, and all of these letters have a tone of satisfaction as to the progress being made in preventive dentistry.

Instead of securing a great number of papers and clinics, your chairman has followed the advanced method of association work, and has secured a man whom he knew to be competent to write a worthy paper for the society. He is here for work also, and I want to have him give several clinics. He has brought with him material for that purpose.

The paper that I shall now read is part of a manuscript for a book on this subject.

[Dr. Adair then read a paper which he stated was the first chapter of his forthcoming book on the subject of "Prophylaxis and Pyorrhea."]

The next order of business was the reading of a paper by Dr. F. H. Skinner, Chicago, Ill., entitled "The Prevention of Pyorrhea and Dental Caries by Oral Prophylaxis," as follows:

The Prevention of Pyorrhea and Dental Caries by Oral Prophylaxis.

By F. H. SKINNER, D.D.S., Chicago, Ill.

The development of pyorrhea is dependent upon two conditions: first, local irritation and susceptibility to infection, second, a lowering of general vital resistance.

The following are some of the conditions which may be classified as local irritation and infection: Soft accumulations allowed to gather and remain at or near the line of attachment of the soft tissues; poor contact points, resulting either from fillings, crowns, improper alinement, or from wearing away of the tooth structure; ill-fitting bands, or bands which have been driven up until they impinge upon the pericemental membrane; improperly shaped crowns which do not protect the soft tissues in the mastication of food; improperly shaped tooth-brushes, or improper use of a brush; fillings not properly finished at the gingival margin, or fillings which will not retain a hard, smooth surface where the gum tissues lie against them, as oxyphosphates and most of the silicate cements; snapping, jamming, or cutting of the septal gum tissue with dental floss or toothpicks, and last but not least, malocclusion.

Some conditions which produce lowered vitality are lack of sufficient use of the teeth in mastication, and systemic diseases, prominent among which are diabetes, intestinal toxemia, faulty metabolism, and anemia.

TREATMENT.

All deposits, both soft and hard, are removed from all surfaces of the teeth not covered by gum tissue and from under the free margins of the gums, but no attempt should be made to go into deep pyorrhea pockets at this time.

Then a thorough polishing is given, as in prophylaxis treatment. If enamel surfaces are etched or rough, either from lack of proper development or from early neglect, they must be planed or filed smooth and polished. I then use the Dunlop spray and dismiss the patient for a day or two, when the gum tissues will be found less sensitive, and the inflammation greatly reduced. For the next two or four weeks I give a Dunlop vapor treatment every three or four days, and a prophylaxis treatment whenever the disclosing solution indicates it to be necessary. This vapor has an affinity for diseased tissue, and it is surprising to see how it will penetrate both soft and bony tissue. I have introduced it at a canine and seen it come bubbling out from the inner wall of the gingiva of the third molar, or even crossing the median line and coming out from the canine or bicuspid on the opposite side, apparently traveling through bony tissue from which, because of infection and inflammation, sufficient calcium salts have been dissolved to leave it a porous, spongy, diseased mass. Red or cyanotic areas located well up on the gum tissues indicate osteitis or osteomyelitis, and can always be reached, and good circulation can be established there by the proper use of the Dunlop vapor.

Nearly every case of pyorrhea exhibits malocclusion; cusps, crowns, bridges, or fillings which bring undue stress to bear on any root or prevent free lateral movement of the jaws in any direction should be ground so as to bring about a perfect correction of the abnormal condition. Plaster models often help in correcting malocclusion. Contact points which allow food to crowd on to the septal tissue should be corrected. Some form of partial plate or removable bridge should be made so as to have the resistance to the opposing teeth depend upon equalization of pressure between abutments and saddles resting upon gum tissue. All saddles should be at least three-eighths of an inch from any teeth, for if closer than that they act as a constant irritant and also impair circulation to the surrounding tissue, and will ultimately result in the loss of the tooth. Any teeth which cannot be made healthy should be extracted at once, for they only keep up irritation and infection in the tissues which we are trying to restore to a healthy condition.

The inner portion of the alveolar process is rather a porous, spongy bone, perforated with many channels, known as Haversian canals, through which a rich supply of blood is furnished to the parts. The lingual and labial plates, as well as the parts which form the alveolus—socket of the tooth—are more dense. Mr. Arthur Hopewell-Smith* of London has termed this hard layer, next to the tooth, which forms the walls of the alveolus, the linea dura. This can be detected very plainly in an X-ray picture. When this linea dura is once entirely destroyed, a tooth cannot be saved.

Splinting all loose teeth is very necessary, for we cannot expect healthy granulations to form when loose teeth are constantly moving around and breaking them up. Sometimes it is necessary to use permanent splints, as bridges, or bands, which may be worn a year or two and then removed, at other times wiring or tying with silk or grass-line ligatures will do.

I prefer to keep pulps vital, for in my

(* See "Some Studies of the Jaws in Health and Disease," by A. Hopewell-Smith, *Dental Cosmos*, August 1913, p. 765.)

opinion a more healthy condition and better attachment of the tissues is obtained. Anyone who has done pyorrhea work recognizes the difference in the sense of feeling when working on the root of a vital, healthy tooth as compared to the spongy feeling of teeth which have been devitalized. If we have to devitalize teeth for bridges or crowns, let us do it, after we have established normal conditions. When possible, I use outside attachments for bridge work, such as inlays or Carmichael attachments, and I do not hesitate to crown a tooth with a vital pulp, providing I can cut the tooth down so as to adapt a well-fitting band—but do not run the band higher than the tooth is prepared for it. Bands can be fitted as accurately as inlays, and prophylaxis will prevent decay at the gingival third.

Of course, the operator must use judgment in selecting his patients for this class of work, preferring those who will keep up oral prophylaxis as described later in this paper.

After a few weeks, under prophylaxis and the Dunlop vapor treatment, some of the pockets, and in a very few cases all of them, will have healed entirely, but usually it is necessary to do instrumentation on some of the roots. Under the Dunlop vapor treatment, larger deposits disappear sometimes, or flake off under very little pressure. I expect the gums to reattach without recession in these places, so I am careful not to injure the pericemental membrane. Where this result is not obtained, thorough instrumentation is necessary.

INSTRUMENTATION.

A great many operators fail on account of selection of improperly designed instruments.

The cementum, or outer covering of the root, presents a rough, irregular, pitted surface to which the pericemental membrane and dental ligaments and fibers gain a very firm attachment. Next under the cementum is a thin, dense layer, and under this are large open spaces known as lacunæ, which are filled with the same substance as the dentinal tubuli. If we cut through the hard layer underlying the cementum and open the lacunæ, we expose a surface where pus-producing bacteria will propagate by millions, and infection and inflammation are sure to follow. In addition to this, an extremely sensitive surface will be exposed, and caries most likely will set in later on.

INSTRUMENTS.

There are a great many so-called pyorrhea instruments on the market without which members of the profession, as well as their patients, would be a great deal better off. I refer to chisels, gouges, scrapers, etc., with which it is impossible to produce a smooth surface, and which do not limit the depth to which they cut. There are only two styles of instruments with which the essayist has ever been successful when thorough instrumentation was necessary. The older of these is the well-known Younger set, which is really a fine, delicate set of scrapers. If the operator keeps these scrapers sharp and has a delicate sense of touch, he knows when he has removed all deposits, dead pericemental membrane, and the rough and pitted surface of cementum, and he stops as soon as he has reached the hard layer; but these instruments, even in skilled hands, cause more or less pain, so that most operators have to use hypodermic injections of cocain. Then, too, they

leave a slightly burrowed surface, and the sharp ends of the instruments frequently lacerate the tissue, so that, following the operation, usually there is soreness which lasts from a few days to a few weeks. The other instruments are known as the Carr scalers.

Several years ago, Dr. Gartrell of Washington, D. C., introduced a blade similar to a Japanese plane, but did not develop a usable set of instruments. Dr. C. M. Carr perfected a set of instruments with which the operator, after learning how to handle them, can reach and plane any and all surfaces of the roots of any tooth, whether it be convex, flat, or concave, except sharp angles where roots bifurcate, in which case an instrument of the Younger type is preferred. When properly sharpened, the blades of these planing instruments cannot be made to cut deeply, but they plane a very thin shaving with each stroke. Almost any operator who has learned to handle them can tell by the sense of touch when he has reached the proper surface. They cause so little pain that it is seldom necessary to use any anesthetic, and all soreness usually leaves within twenty-four hours. I think an operator can do more accurate, delicate work and cause his patient less pain with these planing instruments than with any other form of pyorrhea instruments made.

After the cementum has once been planed to the hard surface, sharp cutting instruments should never be used on it again, for fear of opening the lacunæ. Should the patient be negligent in home care or about keeping appointments for prophylaxis, or be unable to present himself at the dental office regularly, and should deposits start again, there are no better instruments to use than the style known as the Smith trimmers. These soon lose their edge, thereby eliminating the danger of cutting too deeply, yet are sufficiently sharp to remove deposits from the hard surface. The Smith set is good, but a little awkward for reaching obscure places. Dr. R. O. Hutchinson of New York, Dr. T. B. Hartzell of Minneapolis, Dr. J. L. Kelly and Drs. Buckley and Logan of Chicago, Dr. H. H. Tompkins of Utica, N. Y., and, I presume, many others, have added several shanks of different angles to the regular set of these little trimmers or files, making the operation much easier for both patient and operator.

Once all deposits and other rough and irritating substances are removed and the rough tooth surfaces have been planed smooth, daily vigorous rubbing with cotton rolls as suggested by Dr. J. L. Kelly of Chicago, is a great aid in stimulating circulation. The cotton rolls will remove débris from the teeth, cheeks, gums, and roof of the mouth more thoroughly than a tooth-brush will, and it is impossible to injure the teeth or gums with them, as is frequently done by improper handling of a tooth-brush.

About 75 per cent. of the cases of pyorrhea can be cured by thorough instrumentation, and the Dunlop vapor will add 20 per cent. more. I believe that, when the Dunlop vapor has been used, the results are better, viz, the attachment of tissue will take place nearer to the neck of the tooth, and less instrumentation will be required for obtaining results.

The other 5 per cent. of cases which do not readily respond to these treatments are complicated with some systemic condition, and that condition must be diagnosed and relieved. Constipation, faulty metabolism, and intestinal tox-

emia frequently keep up an inflamed condition of the alveolar process and gum tissues. Often, in cases of this kind, the oral condition will respond immediately upon putting the digestive tract in order, but more often, intestinal disturbances disappear upon putting the oral cavity in order.

Dr. Dunlop claims that his vapor treatment has produced beneficial results whenever he has used it in cases of diabetes, and the results obtained in two cases that I have treated during the past year seem to corroborate his claim. Should others obtain these same results, it would indicate a very close relationship between a diseased alveolar process and the run-down condition which results in diabetes.

VACCINES.

Vaccines have proved very valuable in some cases, but it is necessary to determine just what the infecting organism is, in order to obtain results with this treatment. The aerobic forms are easy to determine, but anaerobic bacteria are rather difficult to diagnose and are very difficult to produce cultures from. Strictly anaerobic bacteria are quickly killed or driven from the alveolar process and surrounding tissues by the Dunlop vapor, because they cannot exist in the oxygen which we are able to introduce into the tissues by means of this treatment.

There is one other form of chronic suppuration which is very trying to deal with, in which the gum hugs the neck of the tooth so closely that pus burrows upward or laterally into the process. These cases sometimes respond to vaccine and vapor treatment, but usually it is necessary to open the gum over the cyst —which has been located by an X ray —to curet all necrotic or carious bone, plane the roots to the hard surface, and pack the cavity with gauze and euroform paste for twenty-four hours; then the cavity is charged with Dunlop pocket-packer or Bismuth paste, until filled with granulating tissue. The operator must always be on his guard when a deep pocket, through which a probe can be passed to or near the apex of the root, develops at the side of one tooth, while the rest of the mouth is healthy. Four times out of five this pocket represents an apical abscess resulting from a dead pulp, and not pyorrhea.

Patients always should be told that, as a rule, pyorrhea is the result of neglect; that they will have to work harder than ever before to maintain a healthy condition after they have been cured, and that it is only with their co-operation in massaging the gums and with periodical prophylaxis and constant mouth hygiene that a permanent cure can be maintained, because the same cause will produce the same effect again.

SOME THOUGHTS ON ORAL PROPHYLAXIS PRACTICED AS A SPECIALTY.

Until a more appropriate term has been found, the writer chooses to interpret "oral prophylaxis" as covering any branch of operative dentistry which will meet the ideal requirements from an esthetic point of view and tend to keep his patients' mouths in a hygienic condition, whether it be the insertion of a filling, inlay, or root-filling, the making of a crown, the construction of a bridge, or finishing the "other fellow's" work down at the gingival margin.

Looking at oral prophylaxis from this point of view, it does not seem possible

that the man who sets himself up as a specialist in pyorrhea and prophylaxis, and confines his work to the use of pyorrhea instruments and polishing teeth, is doing the best work in his community, when men not associated with him are depended upon to do the prosthetic work. Nor do I believe that he will be a permanent fixture in the dental profession, for no matter how skilfully the specialist performs his work, it will be a failure in mouths which need repair work, unless the man who does the repair work understands the causes which bring about diseased conditions of the mouth, because bands will be used where they are not indicated, and some of them not fitted overly well at that. Work lacking proper contour to protect the soft tissues will be inserted; fillings, inlays, crowns, and bridges will be constructed which do not occlude properly nor furnish support to the abutments, thereby causing lateral stress on the process, followed by soreness, inflammation, infection, and loss of the organs; bridges which cannot be kept clean will be worn and great masses of food will lodge under them and ferment, thus making a breeding-place where millions of pathogenic germs will be incubated, some of which will be mixed with each morsel of food that is swallowed, besides occasionally infecting the surrounding tissues, and the loss of the teeth is sure to follow work done by men who do not follow out the principles necessary for maintaining hygienic conditions. If teeth are lost after a specialist has once worked on them, it will be the fault of the specialist, from the viewpoint of the patient and the general practitioner; therefore, from this point of view, every dentist should be a practitioner of oral prophylaxis, if not a pyorrhea specialist. The plan suggested by Dr. Robin Adair of Atlanta, Ga., in his paper entitled "The Introduction of Oral Prophylaxis into a Dental Practice," published in the *Dental Summary* for December 1911, should be an inspiration to every dental practitioner. Therefore these suggestions are intended for the man who is carrying on a general dental practice, because anyone who has ever treated pyorrhea successfully realizes the necessity of having his work followed up with such prosthetic work as will maintain healthy conditions.

In fact, if more dentists practiced oral prophylaxis, there would not be as much need for repair work, pyorrhea specialists, or medical men, for the mouth is the intake of the body, and 80 per cent. of all infection enters by this portal, and if it is kept in a clean, healthy condition, the vital resistance is much higher. It is now commonly believed that a great many systemic ailments are contracted through the mouth tissues when these are in a pathological condition.

When pyorrhea pockets and abscesses with sinuses are present, pus is discharged into the mouth, and every morsel of food and every drop of saliva which is swallowed carries quantities of infectious matter into the stomach. This prevents the stomach from properly preparing the food for the intestinal tract, and before it is eliminated from the body poisonous ferments will form and be absorbed. Many systems will tolerate this kind of treatment for years, but sooner or later the effects will become apparent. Infectious matter from blind abscesses, lateral abscesses, and congested areas in the alveolar process is absorbed directly into the circulation, causing various pathological conditions, and is taken up by the lymphatics, and if the lymphatic glands cannot get rid of the in-

fection rapidly enough, enlarged or suppurating glands will be the result. Last, but not least, when masses of decaying matter are allowed to remain around the teeth, infection enters the tissues through the little ducts or glands ("glands of Serres," described in "Interstitial Gingivitis," by E. S. Talbot) which line the inner wall of the gingiva, and is taken up and distributed through the system by the circulation; or osteitis, osteomyelitis, or lateral abscesses and pyorrhea are caused.

Some of the diseases for which mouth infection is held partially responsible are glossitis, diseased tonsils, deafness —through infection of the Eustachian tubes—catarrh and catarrh of the stomach, bronchitis, colds, tonsillitis, stomatitis, diarrhea and constipation, dyspepsia and indigestion, infective endocarditis, enlarged glands, iritis, gout, headache, general infection, septic infection of joints, nephritis, pneumonia, ulcer of the stomach, rheumatic conditions, pernicious anemia with all of its after-effects, tuberculous glands, and tuberculosis. Furthermore, cavities in teeth always contain the tubercle bacilli, which endanger not only the individual harboring them, but also anyone who is near him whenever he expectorates, coughs, or sneezes.

IDEAL PROPHYLAXIS.

Ideal prophylaxis should be started by the prospective mother's mouth being put and kept in first-class condition, so that her mental and physical well-being will be at or above par. Foods containing calcium salts, phosphates and carbonate of lime, are supposed to help make bone, hence should also have a tendency to start a child in the right direction as far as teeth are concerned. Wholesome living, plenty of rest, and outdoor exercise make a very good program for the prospective mother as well as for the child.

A friend who has done a great deal of research work told me that in every case of atrophied enamel of which he could get a history, the child had been a bottle-fed baby, and my own questionings in cases of this kind have all corroborated his findings. So, for this as well as many other reasons, it is best that the child be fed in the way provided by nature, when possible. As soon as a child begins to take food, its mouth should be wiped out several times daily with cotton or a small piece of cloth held in a suitable carrier or wrapped around the index finger. The membrane of the cheeks and gums and beneath the tongue requires special attention, as here coagulated milk usually is found. If the infant's gums become feverish and swollen while teething, there is nothing better than the ingenious little rubber doll with the long nose filled with ice-water, known as the "Koolbite," invented by Dr. J. Bridges of Chicago. Anything a child likes to play with goes directly to his mouth, and this Koolbite, as its name indicates, does a great deal to reduce the inflamed gums. It is so light that the tiniest hands can hold it in place, yet it is too heavy to stay in the mouth unless held there, so that the disadvantages of a comforter are eliminated.

The mother or nurse should be taught that, as soon as the deciduous teeth begin to erupt, they should be kept clean. She should be taught to watch for and remove all foreign substance which gathers on the child's teeth. If she asks how often they should be cleaned, the answer

is, "As soon as foreign matter accumulates on them." She should be told that if she were to mix up the food with her hands as she does with her teeth, she would wash her hands after each instance, and that the same principle applies to the teeth.

The parents should be induced to bring their children to a dentist's office, so that he can make friends of them long before it becomes necessary to do any work for them, and can teach them that, if prophylactic work is done before caries has started, 95 per cent. of this work can be prevented. The dentist by all means should do prophylactic work for children before there are any cavities to be filled. As children grow to be four, five, or six years of age, they like to imitate their parents, so I try to get up a rivalry to see who has the cleaner mouth, the child or the parent.

Between the ages of five and six years, there should be a perceptible spreading of the spaces between the central incisors. Where this is not observed artificial means should be resorted to, in order to develop lateral growth of the anterior portion of the jaws. Wearing a very simple appliance for a month or two at this age will frequently save two or three years of regulating at the age of twelve or fourteen years. Any up-to-date orthodontist will agree that, when the jaws do not show proper growth, a little forced development of the anterior portion at the age of from four and one-half to six years will produce better alinement of the teeth and more esthetic results than can be obtained by waiting until all of the permanent teeth have erupted.

Deep fissures and pits should be protected with cement before caries has set in.

EROSION.

There is undoubtedly such a condition as erosion, but the writer has never seen a case which did not have a history of vigorous cross brushing with a stiff brush and an abrasive powder, at some period of the patient's life. Litmus paper placed in the mixed saliva or on the tongue may show no acid reaction, but when placed just under the gingiva of an eroded tooth, a decided acid reaction will show at that point, indicating that an acid is being excreted. It is my belief that this local condition is produced by some irritant, due either to the improper handling of a brush, to roughened or etched enamel surfaces, or to a very narrow line of foreign substances adhering at the gingival line, which can be made visible only by the use of a disclosing solution.

In these cases, I prevent the patient from using a tooth-brush improperly, or forbid him to use a brush at all, and have him depend upon the cotton rolls and tape for everyday cleaning, and induce him to polish the teeth two or three times a week with an orange-wood stick or a wood point held in a suitable holder.

Of course, I do very careful instrumentation with the planing instruments, so as to remove any local irritation, and I insist on the patient's using the disclosing solution to see that no foreign substances gather and act as an irritant. It is my experience that, after a few weeks, the gingivæ in cases of erosion when treated in this way no longer show an acid reaction to litmus paper, and a very close clinical observation will show no further wasting of tooth structure.

A few individuals can have all kinds of débris on their teeth and the mucous membrane of the gums, cheeks, and

tongue, and yet show no tendency to caries or pyorrhea, and until we can account for this phenomenon, we cannot treat these pathological conditions of the oral cavity scientifically.

Miller and Black account for dental caries by the lactic acid theory. Some of our most scientific and thorough investigators claim that they have never been able to find any lactic acid in the mouth, or in the mass under which decay is taking place. Some claim that tooth destruction takes place by oxidation of foreign matter left on the teeth, but they all acknowledge, and clinical observation verifies the claim, that if it were possible to keep the teeth always clean, dental caries and pyorrhea would not exist, so that unless an individual is absolutely immune to dental pathological conditions, the cleaner his mouth and teeth can be kept, the less trouble he will have. Even if he is immune to dental troubles, he will have more self-respect and command more respect from those with whom he comes in contact, if he has a clean mouth than if he allows it to assume and remain in a filthy condition.

Dr. Frank Low claims to have reduced sensitive conditions at the gingival third and to have obtained at least partial immunity to caries by the administration of tablets composed of ½ grain of sodium sulfocyanate and 2 grains of powdered hydrastis. He gives one tablet every day for twenty days, and if the saliva does not lose its ropy consistence, he may repeat the treatment. My own experience with this treatment shows that the saliva becomes much more watery, and I believe fewer plaques gather on the teeth, those which do gather being more easily removed. Dr. H. P. Pickerill, in his "Prevention of Dental Caries and Oral Sepsis," claims that dental caries is decreased by increasing the quantity and alkalinity of the saliva, and that this can be accomplished by the use of acid mouth-washes and a fruit diet or at least by ending a meal with fruit. He gives several formulæ for mouth-washes in which he uses cream of tartar, commonly known as potassium bitartrate; he calls it acid potassium tartrate. It leaves a very clean, pleasant effect in the mouth. He also says there is nothing better than a slice of orange with which to end a meal.

These theories are, undoubtedly, valuable, but I should not like to depend upon them entirely for saving teeth.

So, while it may not seem scientific to our research workers, oral prophylaxis is at present the best means we have of keeping the mouth and the body, as a whole, in a healthy condition. In order to make a success of this work a dentist must know from experience what clean teeth and a healthy mouth are, for his arguments lack force if he does not practice what he desires his patients to follow.

He must also be able to convince his patients that preventive work is better than repair work; that nature's crowns, when properly formed, are better than the best porcelain crowns he can make, and last, but not least, he must obtain a fee which will pay him to do his work thoroughly. Otherwise, he will become discouraged, and not carry out the technique necessary to obtain results, in which case his patients will say that oral prophylaxis is not a success.

USE OF A DISCLOSING SOLUTION.

Microbic plaques and small granules of calcific deposits are transparent, or so nearly of the color of the teeth that

they are frequently invisible to the eye. The sense of touch, after months of experience with a hand polisher or orange-wood stick, will only imperfectly indicate to us whether or not a surface is clean, so that the only means of absolutely proving whether all foreign substance is removed from surfaces not covered by gum tissue is the use of a disclosing solution.

The following formula has proved the most satisfactory of any I have tried:

Iodin crystals,	50 gr.
Potassium iodid,	15 gr.
Zinc iodid,	15 gr.
Glycerin,	4 dr.
Aqua destillata,	4 dr.

Mix. Put up in glass-stoppered bottle.

Sig. Paint two or three teeth at a time. Rinse immediately with water.

Anything to which the stain adheres is foreign substance and should be removed, and such surfaces should be polished. This is an aqueous solution of iodin, which while it is slightly astringent, does not smart or blister the soft tissues, and when painted on the teeth and gums produces little or no sensation. It leaves no stain on a clean, polished surface, but the most minute patch of foreign substance can be detected at once.

Oral prophylaxis is a term used to distinguish the thorough, periodical work of removing that which causes dental pathological conditions from the so-called "cleaning," which generally means polishing the buccal and labial surfaces of the teeth with a rubber disk or brush wheel used in the handpiece of a dental engine.

For proper polishing in a prophylactic treatment, points of two different shapes, held in polishers, are required; first, a broad, flat point for polishing the distal surfaces of the last molars and buccal and lingual surfaces of the other teeth; second, a thin, sharp point for reaching the interproximal surfaces and the vicinity of the contact points. Dental tape is the only means of polishing one of the most vulnerable and inaccessible surfaces, *i.e.* the contact point and its immediate vicinity; then we should stain and polish until the disclosing solution shows all surfaces to be clean. Of course, any substance which is not readily dislodged with the wooden point and a fine abrasive should be removed with scalers, and the surfaces highly polished. Dental floss is a great aid in indicating the presence and exact location of small deposits of serumal calculus on the approximal surfaces just under the free margin of the gums. It is our duty to smooth and polish any etched or roughened surface, for no patient can keep a rough surface clean. Etched surfaces are detected only by careful hand polishing aided by the use of a disclosing solution.

When a patient first presents himself, unless for the relief of pain, he should be shown the accumulation on his teeth by painting the surfaces with the disclosing solution. He should be given a hand mirror so that he can see the operator apply the stain. The revelation is usually very much of a surprise. One patient said she believed the stain exaggerated altogether. When patients are of this opinion, the cleaning of one or two teeth and the using of the disclosing solution again will readily convince them that it does not exaggerate. The suggestion should be made that if such a fetid, infectious, decaying mass were left on the hand for weeks and even months, the patient would not be surprised if the surrounding flesh became inflamed

and began to suppurate, which frequently happens to the tissues adjacent to the teeth. While working, the operator should explain that enamel is composed of from 95 to 98 per cent. of calcium salts, and that just as the rusting of a piece of steel is a chemical reaction of the elements, so decay of teeth is a chemical reaction between the calcium salts of the enamel and the by-products of fermentation; that this causes the withdrawal of the calcium salts, leaving the tooth structure etched or honeycombed. It should also be explained that, just as the rusting of steel can be prevented by polishing, so dental caries can be prevented by hand polishing, and that as all dental caries starts upon the outer surface of a tooth under a fermenting mass, no mouth-wash can penetrate it to stop decay; also that a great deal of harm is done to gums and tooth surfaces by improper brushing with an abrasive.

A patient should be taught how to handle a brush properly. The first brushing, when the brush is the stiffest and carries the first grit of powder, should be done on the masticating surfaces of the posterior teeth, in order to clean the fissures. A backward-and-forward and side-to-side motion should be used; then the brush should be placed well up on the gums, and with a rolling motion brought toward the occlusal surface, *i.e.* up on the lower and down on the upper teeth on both lingual and buccal surfaces.

In order to expose the lingual surfaces of the teeth to the brush, the tongue should be drawn well back. Frequently I give a demonstration to show the patient how to use the brush, and then have him practice before me until he uses it correctly. He should be careful never to prick the gums with the bristles, as they always carry infection. Patients commonly start brushing always in one place, usually at the gingival margins of some of the anterior teeth. This should be watched for and stopped, for the brush is always stiffer when first put into the mouth, and this, in connection with the first grit, if an abrasive is used, and applied in one place year after year, is sure to cause gum recession and to wear through the thin enamel of the gingival third.

I prefer rather small brushes of medium texture. The lingual surfaces of anterior teeth can be brushed best with a small brush, which can be used with a rolling motion, because a brush of ordinary size bridges over the inside of the arch. The lingual surface brushes which are used as a hoe are sure to prick through and thus infect and injure the gum tissues. A brush never should be used more than once in twenty-four hours; therefore enough brushes should be kept on hand to allow each one to dry out before it is used again. The teeth and gums should be brushed after each meal. The chief good a tooth-brush accomplishes is the removal of some of the loose débris and the massaging of the gums, which produces a hardened and healthy condition. But if a brush is not properly handled, it produces damage rather than benefit.

Dental tape or floss should be used for polishing the approximal surfaces at least once a day. When putting this past the contact points, a short, tight hold should be taken of the tape, holding the buccal end a little higher than the lingual, so as to pass the contact points rather sidewise, thus keeping the tape from snapping down on the gums.

This home care, with periodical visits

to the dentist, will keep the teeth looking clean, but little rough patches begin to gather within from two to six days after a prophylactic treatment, and are discovered by the tongue. The use of the disclosing solution verifies the discoveries of the tongue. The tooth-brush, although used intelligently, will not keep these fermenting patches from forming, nor entirely remove them. To prevent pyorrhea and dental caries, the teeth must be more than esthetically clean.

My patients rub their teeth, cheeks, and palate and massage their gums with a roll of cotton held in a suitable holder. I believe they are doing more effective work with this and the dental tape than with the tooth-brush. It cannot injure the teeth or soft tissues, and where it reaches, the cotton seems to remove débris left by the tooth-brush. It also removes all viscous materials, dead cells, and particles of food from the mucous membrane. As far as I know, the idea of this use of a cotton roll was first suggested by Dr. J. L. Kelly, Chicago. According to Dr. Pickerill the presence of these foreign substances tends to reduce the tooth-preserving properties of the saliva.

Patients are provided with a cotton-roll carrier, a supply of cotton rolls, polisher and points, dental floss or tape, a mouth-mirror and iodin disclosing solution or its formula, and the majority of them learn to use these articles very well. Frequent, periodical, professional prophylaxis treatments are the only means of preserving the teeth of patients who do not care to learn how, or who do not have sufficient dexterity to handle a polisher.

The intervals between treatments must be determined by experiment. Some patients will keep their mouths reasonably clean for only fifteen days, others for thirty, sixty, or ninety days, but when the period has been established, they should be notified regularly, for they procrastinate or forget entirely, and regularity of treatments is absolutely necessary.

The only way to tell, definitely, whether or not foreign substance is present, is to use a disclosing solution, and thus we are enabled to polish only where débris is lodged. This is a great advantage, as we desire to obtain absolute cleanliness with the least possible wear to the tooth surfaces.

The only time a dental engine should be used in this work is when it is necessary to grind cusps which cause malocclusion or to smooth any surfaces which have become etched or are starting to decay. When these places are sensitive, a 40 per cent. solution of silver nitrate should be applied, if discoloration is not objectionable, otherwise a 10 per cent. solution may be used; the latter discolors only where decalcification has set in. Deliquescent zinc chlorid or formaldehyd may be used with absolutely no danger of discoloration, but the latter must not be allowed to touch the soft tissues, for it causes severe pain, soreness, and sloughing. The hand polisher and wooden points are preferable in subsequent treatment, for a revolving rubber disk or brush wheel does the most wearing and polishing just exactly where the brush and cotton roll keep the teeth the cleanest. Moreover, if the revolving disk and brush wheel are allowed to touch the gums, they cut and cause scar tissue, which is sure to start recession.

DR. PICKERILL'S OPINION.

Dr. Pickerill says that acids will osmose through Nasmyth's membrane

and cause decalcification, but thinks that with applied dietetics and with the use of acid mouth-washes, calcium salts can be made to predominate in the saliva; these salts, when they are held in solution by the presence of carbon dioxid, osmose through Nasmyth's membrane, and when the carbon dioxid passes off, they precipitate in the outer surface of the enamel, thereby hardening it and increasing its resistance to decay. He therefore discourages the polishing of tooth surfaces, for fear of damaging Nasmyth's membrane. I have never been able to discover anything like the hard, tough membrane Dr. Pickerill describes, and other investigators with whom I have discussed this subject give the same report. For protection against the accumulations which gather on the teeth of most people, I would rather depend upon the results obtained by keeping the surfaces clean and highly polished than upon the precipitation of calcium salts into the enamel through the agency of a few epithelial cells which cling to newly erupted teeth.

There are certain pathological conditions in which mouth-washes are indicated, but, ordinarily, if a mouth is kept clean, it is healthy, and I can see no more reason for the daily use of a medicated mouth-wash than for the constant use of medicine by a healthy man.

Most powders and pastes contain a slight abrasive, a little soap, a mild disinfectant, and some kind of flavoring. Patients frequently ask, "What powder or paste shall I use?" My answer to this question is, usually, that I do not care so much what they use, as how they use it. In fact, the healthiest mouths in my practice are the ones in which I have polished the teeth with XXX silex and tin oxid, and had the patients follow this up with cotton rolls and tape for daily cleaning, also using the wooden points, intelligently, two or three times a week.

Clean mouths and clean teeth mean a higher moral, mental, and physical development, and three-quarters of the clean-mouth campaign is won when patients have become educated so as to realize that there is irritation when there is the slightest accumulation on the teeth or mucous membrane of the mouth.

Discussion.

Dr. I. N. Carr, Durham, N. C. There is no subject nearer to my heart than that of oral prophylaxis. I have taken a deep interest in this subject for a number of years; still more so since my connection with the National Hygiene Association. The paper we have listened to is not discussable; it is absolutely perfect in all its pronouncements, and the truths enunciated therein cannot be gainsaid.

With one statement in particular I heartily agree, viz, that an absolutely clean tooth will not decay. I do not agree, however, with the statement that erosion is caused by undue brushing with the tooth-brush. It occurred to me, when the essayist made that statement, that he was confusing mechanical abrasion with chemical erosion. Most of us have seen many cases of abrasion caused by the tooth-brush. I know of the case of a man who brushed his teeth in the old-fashioned way to such an extent and with such a stiff brush that he actually brushed the enamel from the peripheral margin and cut into the tooth an eighth of an inch, so that the pulp could be seen through the dentin. This is mechanical abra-

sion, but erosion, such as I think the essayist was describing, I look upon as being due to chemical action. Mechanically *abraded* teeth are always smooth and polished, while chemically eroded teeth are not smooth or polished, but more or less pitted. This we used to attribute to the action of acid on the calcium salts of the tooth.

I do not believe that it is a good plan to put any highly abrasive substance in the hands of our patients for brushing the teeth.

The essayist failed to mention the rinsing of the mouth by the patient. Rinsing the mouth does not mean simply filling the mouth with water, turning it around and ejecting it. By rinsing I mean making a bellows of the cheeks and gums, and forcing the water through the interstices of the teeth, this force being almost fifty pounds of air pressure. If a patient had never heard of a toothbrush and would rinse the mouth thoroughly after each meal, the chances for caries of his teeth would be small.

Dr. Evans. I would like to ask Dr. Skinner to tell us what his criterion is for hopeless cases.

Dr. Skinner. Are you speaking of pyorrhea or caries?

Dr. Evans. You speak of eliminating all hopeless conditions. What do you consider as absolutely hopeless conditions?

I would also like to ask whether any suggestion has ever been made of danger resulting from acids forming from soap, if the mouth is not sufficiently well rinsed.

Dr. Robin Adair, Atlanta, Ga. In answer to the suggestion that Dr. Skinner in this paper had covered the whole field, I would say that in my opinion he has hardly scratched the surface of this subject. It is impossible for him to cover the whole ground in one paper. His method of treatment consists in giving closest attention to the many details, and I am sure that, if you would read his other writings on this subject, you would be as much benefited as you have been by this paper.

Dr. Parcher. There is one question with regard to oral prophylaxis that I have been asked hundreds of times, and I want to ask it here. How do we get our patients interested? I know something of Dr. Adair's method, but I wish he would state how he selects his patients, and what standards he uses for interesting his patients in the work.

Dr. Skinner. Dr. Carr spoke of erosion, when the surfaces are smooth, as mechanical abrasion, and of roughened surfaces as chemical abrasion. In all the books I have studied, true erosion is described as a smooth, polished surface. If a tooth is broken down by acid fermentation resulting from débris left on the tooth, there will be a rough surface, but I never have heard that form of tooth destruction classed as erosion. The point which I intended to bring out in the paper with reference to erosion was that, when an abrasive is indicated, I polish the teeth with XXX silex and tin oxid in order to produce a brilliant polish, and then have the patients use the cotton rolls and wooden points alone, but no abrasive, and theirs are the healthiest mouths.

Thorough rinsing of the mouth with water, as described by Dr. Carr, is a very valuable adjunct to oral cleanliness, and should be practiced immediately after meals. If we wait until food products have become practically glued to the teeth by bacterial action, the rinsing will not do so much good,

but if done immediately it takes off nearly as much as the brush does, and cannot injure either gums or teeth.

One gentleman asked how to differentiate, in pyorrhea cases, between teeth that can and those that cannot be saved. The X ray furnishes practically the only positive diagnosis of how much bone remains, and whether the linea dura is not entirely gone. If the linea dura is gone, the tooth cannot be saved. A tooth which has much up-and-down motion is usually hopeless, but undue stress and malocclusion will sometimes produce this churning effect in teeth in which the X ray shows vital pulps and good attachment around the apex of the root, and the linea dura not entirely destroyed. By grinding these teeth to relieve undue pressure, or by pressing them into the alveolus, they can frequently be saved. If absorption of the root has started, or there are deposits on the apex, and the linea dura is entirely gone, we had better cure the pyorrhea around that tooth with the forceps.

I believe that soap or any saponaceous substance used in connection with the tooth-brush is suitable, as it lubricates the bristles so that they do not cut the gums or teeth so badly. Dr. James recommends Ivory soap and a smooth tooth-brush for massaging the gums. I believe, however, that cotton rolls produce better results than the tooth-brush in massaging the tissues.

Dr. Adair spoke of the paper as only touching the surface of oral prophylaxis. That is true. The more you become interested in prophylaxis, the more you can say on it, which is in line with the question of how to start this work: I do not know of any more convincing way than to have some good operator take care of your mouth, put it in a healthy condition, and maintain it in a prophylactic condition for six months. That will make anyone enthusiastic on the subject of oral hygiene.

With regard to the use of the disclosing solution in connection with oral prophylaxis, it is surprising to intelligent patients to see how easily filth deposits on the teeth can be discovered by its use. It usually embarrasses people to see how much dirt the disclosing solution shows on their teeth, and it makes them realize the necessity of oral hygiene, and, as the dentist becomes interested, he will naturally impress these feelings upon his patients.

Keeping the teeth and the alveolar process in a healthy condition involves a very grave responsibility. Articles written by Dr. Hunter and others have placed a great deal of our mechanical skill in a bad light. We know that devitalized teeth and large fixed bridges are, as a rule, a menace to health; also that the loss of a tooth spoils the entire side of the mouth, as far as perfect mastication goes, and that imperfect mastication and insalivation of food means loss of food value, indigestion, and ill health.

A dentist must have a thorough realization of the value of a good set of teeth; he must master a short, concise method of imparting that knowledge to a patient, and lastly, possess the ability to make good in his work.

Dr. Carr. I think Dr. Skinner misunderstood me. I stand by the statement that there is a vast difference between mechanical abrasion and chemical erosion, and that in chemical erosion, the tooth surface is never smooth as in mechanical abrasion. The text-books of Tomes, Garretson, Kirk, and others distinguish between chemical and mechan-

ical erosion, and I believe Dr. Skinner is confounding my idea with caries of the teeth, and not with chemical erosion *per se*. An eroded surface, as you all know, is a surface that has been acted upon chemically; an abraded surface is one that has been acted upon mechanically.

Dr. Adair. I think Dr. Skinner has answered very satisfactorily Dr. Parcher's question when he speaks of the dentist himself becoming interested in oral hygiene. That is the whole thing, and a paper could very well be written on that subject.

The way in which I do this work is almost compulsory. In the first place I will not do dental work in the mouth of a patient until his teeth have first been cleaned by the dental nurse. When this is done, the patients are instructed to buy a tooth-brush, and are then taught by the nurse how to use it. Then they become interested and begin to ask questions as to what they must do to keep their mouths in this condition, because the teeth look so nice, and the mouth feels so well. Let them make an opening of this kind, and then tell them that they can do that by taking the prophylaxis treatment every few months.

Dr. Campbell. Dr. Skinner made the statement that in one case where sugar had developed in the urine, the sugar disappeared after prophylactic treatment, and I wish he would tell us something of the relationship of the prophylactic treatment with the disappearance of the sugar.

Dr. Skinner. That was not stated in the paper, but in two cases of that kind the condition cleared up, which to me indicates the close relation between the alveolar process and the system. The alveolar process is a vascular, porous, spongy bone tissue when in a diseased condition. Septic matter is being constantly absorbed by the system from it, and this has a very important bearing on the systemic condition. We apparently can put the alveolar process in a healthy condition with the Dunlop vapor, and thereby stop absorption of septic matter. By stopping that breaking down of the process, we eliminate one of the means of tearing down the system. Diabetes is a breaking down of the vital organs of the system, of which it may attack one or another, supposedly the liver.

In the cases of diabetes I have treated, good results have followed prophylactic dental treatment.

The meeting then adjourned until Wednesday morning.

SECOND DAY—Wednesday, July 23d.

The meeting was called to order at 9.30 o'clock, Wednesday, July 23d, by the President, Dr. Foster.

The first order of business was the Report of the Committee on Army and Navy Dental Legislation, which was read by the secretary, Dr. Dean, as follows:

REPORT OF COMMITTEE ON ARMY AND NAVY DENTAL LEGISLATION.

To the Officers and Members of the National Dental Association—Southern Branch:

Your committee has the pleasure of again reporting more advanced legislation. We were fortunate in having the Naval Appropriation Bill amended in 1913 as in 1912, though the conditions were unfavorable in both instances. The chief features of the dental amendment of 1913 are—

(1) The creation of a Dental Reserve Corps, which was sought in 1912 and desired for many years, which shall differ in no respect from the Medical Reserve Corps, except that the qualification clause shall be extended to include the degree of D.D.S.

(2) A provision whereby the dental reserve corps may be utilized as a provisional corps of more experienced men while awaiting the selection of the best available young men for permanent service in the regular corps.

(3) A provision which prescribes that no dental surgeon shall render service, except temporary service, until his nomination shall have been confirmed by the Senate.

(4) That dental corps appointments of permanent tenure shall be made from the membership of the dental reserve corps as in the case of medical corps appointments from the medical reserve corps;—this includes a term of preparation at the Naval Medical School in Washington.

These features should be regarded as of exceeding importance, more especially as the administration of the law of 1912 might easily result in the selection of men by methods so questionable as to prohibit the idea of impartial sympathies and a kindly disposition to co-operate with the dental profession in its efforts to obtain the most worthy of its better-educated young graduates to represent it in the naval service. Announcements of impartial competitive examinations through the dental journals and the dental colleges and societies would reassure the profession of its opportunity to show its vital interests and its friendly disposition toward the object of securing to the service those best equipped by education and high professional character to meet the dental needs of the navy *personnel* and the economic interests of the government.

Another and material advantage intended by Congress to be more certainly accomplished by the new law than the law of 1912, namely, the emphasis it gives to the method of compelling the scrutiny of the Secretary before appointing, and of the Senate before confirming, will doubtless give the profession a proper and highly useful influence in regard to the passing on the qualifications so essential to the welfare of the profession as well as to the further advancement of the status of the dental service. In any event, these means and opportunities of scrutinizing the fitness of appointees must be recognized as wholesome and proper precautions, as against methods of unrestrained and practically non-competitive selection. Though these beneficial results may not be as quickly realized as may be desired by those who view the interests and ambitions of the profession as of easy attainment, there is no doubt that they will be realized in large measure and at an early date.

We fear there are but few who realize fully the immense importance of the recent army and navy dental legislation to the status of dentistry as a profession among the professions represented in the military and naval services, and we therefore offer for your information and fuller appreciation the following analysis of the effect of the previous non-

recognition and the present legal recognition of dentistry.

Before the enactment of any army and navy dental laws was secured by your committees, the situation was simply as if the words "dentistry," "dental profession," and "dental surgeon" had no significance. Having no recognition in law, the dental surgeon in the military service could have no professional rights under the law. In the few individual and unauthorized cases of the assignment of men to do military dental service, the graduates in dentistry of our great universities and the enlisted man in the navy stood on equal social and professional footing, not merely in theory but in law and in fact, as was demonstrated by actual experience in particular cases. They had no right to their civil title or benefit of their college degree, nor to a position indicative of their function, nor to any degree or equality with "an officer and a gentleman," from whose social position theirs differed as widely as does that of the non-English-speaking laborer from that of the manufacturer who employs him, or as that of the valet from his employer. These are not exaggerations, but easily demonstrable illustrations of the condition that prevailed—surely a reflection on the civil status of dentistry!

What of the present—and, for that matter, of the future—of dentistry in its relation to the other professions in the naval service? Under the recent act of Congress, passed in pursuance and in consequence of fair hearings on the real issue, namely, the recognition of dentistry as a profession on a social and educational basis with other professions, the United States government is committed to the official recognition of dentistry. Therefore it is provided by law that the navy dental surgeon "shall take rank and precedence in the same manner and in all respects as in the case of appointees to the medical corps," and shall have "the same pay and allowances as officers of corresponding rank and length of service in the medical corps," and shall be entitled to retirement "in the same manner and under the same conditions as medical officers." They are also eligible, under the provisions of the law of 1912, to membership in the medical reserve corps of the navy, and additionally, to constitute a dental reserve corps under act signed by the President March 4, 1913, which creates a dental reserve corps differing in no respect from the medical reserve corps, except that the qualifying degree is extended to include that of Doctor of Dental Surgery.

Could any act of Congress be so phrased as to more forcibly and impressively carry the government's stamp of approval of dentistry, and more emphatically remove the stigma attached to it previously? or could any single act of the government more definitely or forcibly acknowledge the value of the educational course of the dental schools of America, or more gracefully acknowledge the importance of the function of the dental surgeon, than has been done by the recent acts of Congress?

There is now authorized the expenditure of about $500,000 per annum to meet the dental requirements of the army and navy, with an automatic proportional increase as the army and navy *personnel* is increased.

We are not to rest on the advantages gained. There must be promotions of dental officers in both the army and the navy, and we are confident that we are justified in assuring you that our work has made this next step probable at an early date.

Respectfully submitted,

Wm. Crenshaw, *Chairman*,
Chas. W. Rodgers,
Wm. H. DeFord,
Committee.

The Secretary then read the following resolution, which was on motion adopted by the association:

Resolved, That the Southern Branch of the National Dental Association, representing the state societies of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, Missouri, North Carolina, South Carolina, Tennessee, Texas, Virginia, and West Virginia, and assembled July 22, 1913, at Old Point Comfort, Va., in annual session, hereby strongly approves the Dental Reserve Corps Act of March 4, 1913, because said act provides that all appointments shall be made by the President and confirmed by the Senate; and further authorizes the Secretary of the Navy to order the members of the said reserve corps to temporary active service, thus

providing a ready means of meeting the dental needs of the *personnel* of the navy and marine corps with the service of men of the required skill and experience while developing a regular dental corps from men whose age at entrance precludes their having the required skill and experience; and be it further

RESOLVED, That this resolution be forwarded to Secretary Daniels, under the seal of the Southern Branch, and with the assurance that the profession of the several states represented will, if permitted, gladly co-operate with the Navy department in all efforts to attract to the navy dental service the best-equipped and most suitably qualified dental surgeons available through co-operative effort and a patriotic pride and interest in the welfare of the navy.

The Secretary next read the following resolution with regard to appointments to the Navy Dental Reserve Corps, which was adopted by the association:

RESOLVED, That the Southern Branch of the National Dental Association, in annual convention assembled at Old Point Comfort, Virginia, July 22, 1913, hereby expresses approval of the appointment, made April 23, 1913, by President Woodrow Wilson, by and with the advice and consent of the Senate, of Drs. Williams Donnally, Vignes E. Turner, and Geo. C. Küsel to membership in the Navy Dental Reserve Corps, and to acknowledge the recognition of the dental profession thereby implied.

The Committee on Necrology, through the chairman, Dr. DONNALLY, presented the following report:

REPORT OF THE COMMITTEE ON NECROLOGY.

Mr. President and Gentlemen,—Your Committee on Necrology beg leave to report that since our last meeting the Southern Branch of the National Dental Association has to mourn the death of some of its most valuable members, and desire to express sincere regret at the loss sustained. Not only does this association feel this loss, but the entire profession recognizes it, especially the members in the South, to whom they were best known.

The following are those who have died during the past year: L. D. Carpenter, Atlanta, Ga., J. A. Hall, Collinsville, Ala., T. M. Allen, Tampa, Fla., Louis D. Archinard, New Orleans, La., P. H. Wright, Oxford, Miss., and Geo. S. Tigner, Atlanta, Ga.

ISAAC N. CARR,
R. L. SIMPSON,
WILLIAMS DONNALLY,
Committee.

Motion was made and carried that the report be accepted, and that a memorial page be inscribed to these departed members in the records of the association.

The next order of business was the report of the Committee on Orthodontia, by the chairman, Dr. Jos. EBY, Atlanta, Ga., as follows:

REPORT OF THE COMMITTEE ON ORTHODONTIA.

As chairman of the Committee on Orthodontia, I would suggest that this branch of dentistry is at a stage of progress which merits a full and comprehensive digest at this time, without discounting the great work accomplished during the past twenty-five years by such men as Drs. Norman W. Kingsley, Talbot, Guilford, Jackson, Case, Angle, Ottolengui, and many others. Perhaps the past three years have brought out more of progress, and have founded this branch of dentistry on the basis of an exact science, by the great research work of such men as Dr. Alvin Oppenheim of Berlin, Dr. Frederick B. Noyes of Chicago, and others, who have gone so thoroughly into the histology and physiology of the causes of irregularity, and the establishment of the fact that the normal or ideal tooth movement is accomplished by a mild mechanical stimulus, which places diagnosis as to causes and the mechanical application as to forces on a positive basis.

The greatest step toward successful orthodontia has been the establishment of the wonderful course given by Dr. Angle in his School of Orthodontia, which beyond a doubt has the finest selection of all of the highest qualified specialists in all of the allied branches of orthodontia which could be gathered out of the world today.

The course is absolutely thorough, and their knowledge of both theoretical and practical orthodontia qualifies the graduates of this school to be absolutely the foremost exponents of this branch of dentistry by virtue of their wonderful training. Through the medium of Angle's classification, founded upon the basis of normal occlusion, and with a knowledge of the facts presented by the great research work of Drs. Oppenheim and Noyes, previously mentioned, Dr. Angle personally has applied his wonderful mechanical genius in an improved form of appliance, which produces a stationary anchorage and an absolutely perfect control of every form of tooth movement, eliminating all liability of movement of anchor teeth, or the development of unexpected complications, which are so often caused by a misapplication of force.

With an intimate knowledge of this new appliance and an expert skill in its insertion, we are now able to make an ideal correction of any form of irregularity.

Founded upon the basis of a return to normal conditions, a new phase of the latitude of orthodontia has been established in the restoration of constricted nasal development by the application of appliances for the development of the nasal cavities to their normally intended size, which goes back one step farther than the mere correction of the irregularity of teeth in the cases where mouth-breathing, caused by adenoids, has so seriously disarranged normal respiration and demoralized the balance and harmony of all the facial muscles. During the past five years, Dr. V. H. Jackson of New York has made wonderful progress in the improvements on his wonderful system, with its ideal application of stimulus for the accomplishment of tooth movement in a normal and painless manner, which cannot be passed without the most careful notice and the highest praise.

The profession at large is looking forward with a great deal of anticipation to the publication of the second edition of Dr. Jackson's text-book, which in many ways is going to be a revelation in the practice of orthodontia by the general practitioner when the services of specialists cannot be secured—for his system during the past ten years has made possible the wonderful improvement, if not the perfect correction, of thousands of cases of malformation which practitioners at large would have felt loath to undertake without the Jackson appliance.

Orthodontia is no longer a speculation, and almost any dentist may feel sufficient confidence with the appliances now at hand to undertake the correction of an irregular condition which it may fall to his lot to meet. The time has come when no dentist can underrate the necessity of possessing a fair knowledge of the causes and the diagnosis of malocclusion, the mechanical application of corrective means, and of applying such knowledge in his practice.

I hope this partial report will convey a few ideas of the conditions of active progress which orthodontia is making, for at the present moment it is unquestionably borne on the shoulders of some of the greatest scientists which any branch of our profession has ever produced.

JOS. EBY, *Chairman.*

Dr. CARR moved that the report be adopted. [Motion carried.]

Motion was then made and carried to adjourn until Thursday morning session.

THIRD DAY—Thursday, July 24th.

The meeting was called to order on Thursday morning, July 24th, at 10 o'clock, by the president, Dr. Foster.

The first order of business was the report of the Committee on the President's Address, which was read by Dr. T. T. Moore, Jr., as follows:

REPORT OF COMMITTEE ON PRESIDENT'S ADDRESS.

Inasmuch as we have carefully considered the splendid address of the president of this association, and recognize the rightfully parental attitude, we recommend—

That the Southern Branch of the National Dental Association continue its organization and its relation to the parent body, and that our next meeting be held more nearly in the center of the territory represented by its membership.

We feel that the Southern Branch of the National Dental Association has a distinct mission to perform; and that the cause of its inception and growth must be recognized. The sacred history of its early life and its splendid record in professional accomplishments, persuade your committee to ask for a unanimous vote of confidence in the association, and its continuance as before related.

Respectfully submitted,

B. Holly Smith,
R. W. Carroll,
Thos. T. Moore, Jr., *Committee.*

The next order of business was the report of the Committee on Chemistry, which consisted of a paper by Dr. N. A. Teague, Augusta, Ga., entitled "Metallurgy," as follows:

Metallurgy, with Special Consideration of Gold. The Science and Art of Metallurgy. Metal-workers. Dental Metallurgy.

By NEWTON A. TEAGUE, D.D.S., Augusta, Ga.

Metallurgy is a branch of applied science the object of which is to describe and criticize scientifically the methods used industrially for the extraction of metals from their ores. Of the large number of metals enumerated in the handbooks of chemistry, the vast majority, of course, lie outside its range. "In metallurgic discussions the term 'metallic' as applied to compounds has a restricted meaning, being exclusive of all the light metals, although one of these, namely, aluminum, is being manufactured industrially."

HISTORICAL REVIEW.

The history of metallurgy up to the most recent times is obscure. It was only about the beginning of the nineteenth century that this art had come to be at all scientifically criticized, and, in the case of the more important processes, all that science has been able to

do has been merely to put her stamp upon what experience has long found to be correct.

Great and brilliantly successful scientific efforts in the synthetic line are not wanting, but they all belong to recent times. Science, by its very nature, aims at publicity; empiricism at all times has done the reverse, hence a history of the development of the art of metallurgy does not and could not exist.

The earliest evidence of a knowledge and use of metals is found in the prehistoric implements of the so-called bronze and iron ages. In the earliest periods of written history, however, we meet with a number of metals in addition to these two. The Old Testament mentions six metals, gold, silver, copper, iron, tin, and lead. The Greeks, in addition to these and to bronze, came also to know mercury; and the same set of metals without addition forms the list of the Arabian chemists of the eighth, and of the Western chemists of the thirteenth century. During the fifteenth century Basilius Valentinus discovered antimony; about 1730–40 the Swede Brand discovered arsenic and cobalt—the former is not reckoned a metal by modern chemists—while the Englishman Ward recognized the individuality of platinum. Of the four metals, palladium, rhodium, iridium, and osmium, which always accompany platinum in its ores, the first two were discovered by Wallaston in 1803, the other two by a number of chemists.

After Davy in 1807 and 1808 had recognized the alkalis and alkaline earths as metallic oxids, the existence of metals in all basic earths became a foregone conclusion, which was verified sooner or later in all cases. Of the large number of discoveries of rare metals which have been made in more recent times, only a few can be mentioned as marking new departures in research, or offering other special points of interest.

The development of earlier notions on the constitution of metals and their genetic relation to one another forms the most interesting chapter in the history of chemistry. What modern science has to say on the matter is easily stated: "All metals properly so called—*i.e.* all metals not alloys—are elementary substances, hence chemically speaking they are not 'constituted' at all, and no two can be related to each other genetically in any way whatever. All metallic elements agree in this, that they form each at least one basic oxid, or what comes to the same thing, one chlorid, stable in opposition to liquid water. This at once suggests an obvious definition of metals as a class of substances, but the definition would be highly artificial, and objectionable on principle, because when we speak of metals we think, not of their accidental chemical relations, but of a certain sum of mechanical and physical properties which unites them all into one natural family."

CHEMICAL CHANGES IN METALS.

The chemical changes to which metals are liable may be classified according to the loss of metallicity involved in them. Any two or more metals, when mixed together in the liquid state, unite chemically, or at least molecularly, in the sense that although the hot mixture on standing may separate into layers, each layer is a homogeneous solution or "alloy" of, in general, all the components in one another. With binary combinations, the following two cases may present them-

selves: (1) The two metals mix permanently in any proportion; (2) either of the two metals refuses to take up more than a certain limit-proportion of the other. Hence a random mixture of the two metals will in general part in two layers, one a solution of A in B, the other a solution of B in A. The first phenomenon presents itself very frequently; it applies, for instance, to gold and silver, gold and copper, copper and silver, lead and tin, and any alloy of these two and bismuth. The existence of crystallized alloys, as the phenomenon of liquation generally, strongly suggests the idea that alloys generally are mixtures, not of their elementary components, but of chemical components of these elements with one another, associated possibly with uncombined remnants of these.

As the number and character of metallic combinations are infinite, differing not only in the number of component metals but also in the quantity of each, their systematic scientific study is difficult and their classification is rendered imperfect. That of Matthiessen is most satisfactory and intelligent for all practical purposes. He regards it as probable that an alloy is either (1) a solution of one metal in another, (2) a chemical combination, (3) a mechanical mixture, or (4) a solution of one metal in another —or all of the above.

Several of the metals when melted with each other unite apparently in the same manner as sulfuric acid mixes with water, in all proportions forming a perfectly homogeneous mixture with no tendency to separate upon cooling. Examples of metals combined in definite proportions frequently occur in nature, as, for instance, the native alloy of gold with silver, in which four, five, six, or twelve atoms of gold are found combined with one of silver.

The relation of the fusing-point of alloys to those of the constituent metals is variable, and cannot be anticipated theoretically. The fusing-point of an alloy is always less than that of the least fusible metal composing it, and often below the melting-point of the most fusible of its constituents. The curious alloys known as "fusible metal" illustrate this.

Color. Changes in color result from alloying metals, the product generally resembling that of the predominating metal. An exception, however, may be noted in an alloy of 3 parts silver to 7 of gold, which produces a greenish alloy used in jewelry and ornaments.

Conductivity. The conducting power of alloys for heat and electricity is inferior to that of pure metals. While great differences may exist between the physical properties of an alloy and those of the metals composing it, yet certain of the metals when present in an alloy confer upon it definite properties which are characteristic. Cadmium and bismuth increase fusibility, tin hardness and tenacity, arsenic and antimony brittleness.

Gold.

Atomic weight 195.7. Symbol, Au (aurum).

Gold is one of the few metals which is found in the metallic state, and one of the first known to man. Allusions to it are frequent in the Old Testament, and jewels and vessels found in Egyptian tombs afford evidence of the perfection attained in working it at a period earlier than the government of Joseph. There are many evidences that the processes of alloying, refining, and

separating gold were practiced at a very early period of the world's history. According to Pliny, the metallurgy of gold was known in his day. Vitruvius also gives a detailed account of the method of recovering gold by amalgamation from cloth into which it had been woven. It was employed in Rome for the purpose of fixing artificial teeth more than three hundred years before the Christian era, and a law of the Twelve Tables makes exception with regard to such gold, permitting it to be buried with the dead. (Phillips' "Metallurgy.")

The great beauty of color and luster and the power of resisting oxidation which gold possesses have caused it to be valued from the earliest ages for the purposes of adornment and as a circulating medium.

Occurrence. Gold is of nearly universal distribution, and is found in nature chiefly in the metallic state as native gold. The native metal is sometimes found in the form of cubic crystals, in octahedra, and in more irregular and complex shapes called nuggets and dust. It is found in quartz veins or reefs traversing slaty or crystalline rocks, alone or associated with iron, copper, arsenical pyrites, galena, silver ores, and more rarely with calcium, tungstate, bismuth and tellurium minerals. Gold occurs in nature very nearly though never quite pure, being generally associated with silver. Other metals are occasionally found combined with it, but in very small quantities, and these foreign metals are peculiar to localities. Thus California gold, in addition to silver, which is always present, may contain iridium; Russian gold often contains platinum, and specimens of the native metal from Brazil will not infrequently be found to contain palladium. Gold is never found alloyed with copper.

Methods of Production of Chemically Pure Gold.

There are several methods by which chemically pure gold may be obtained. The aqua regia used in its preparation should consist of two parts of hydrochloric and one of nitric acid, the specific gravity of the former to be about 1.16 and of the latter 1.45. Each ounce of gold will require for its solution about three and one-half ounces of the mixed acids. The action of this mixture upon the metal will in the beginning be quite energetic, but as the solution approaches saturation, the application of moderate heat is required to dissolve the last portion of the gold. Care must be exercised in the separation of the gold solution from the argentic chlorid, which subsides to the bottom of the vessel; also to rid the liquid of the small portion of silver held in solution by the acid. The solution is cautiously transferred to an evaporating dish by means of a siphon, heat is supplied, and, as the bulk gradually is reduced by evaporation, more argentic chlorid will be separated and deposited at the bottom. The supernatant liquid should be again poured and siphoned off, and this procedure repeated as often as the residue appears. When the solution becomes viscid and of a deep ruby color, the heat is discontinued, and auric chlorid soon crystallizes in a mass of prismatic forms. It should then be dissolved and largely diluted with distilled water acidulated with a few drops of hydrochloric acid, and, after standing a few days to permit further subsidence of argentic chlorid, it should be filtered,

when it is ready for precipitation. This may be accomplished by quite a number of different reagents, but the form of the precipitated metal depends upon the nature of the precipitant, and it may be thrown down in a spongy condition in sheets resembling foil, as a powder, in a more or less crystalline state, and in scales.

The highly diluted neutral solution of the trichlorid just described is quite liable to decomposition by dissociation. The best agents for the precipitation of gold are oxalic acid, sulfurous acid, and ferrous sulfate. Oxalic acid will precipitate several forms of gold from the spongelike masses to the different crystalline or powdery forms. Its action is, however, slower than that of the other reagents, and it requires to be slightly heated. The reaction is shown in the following equation:

$$2AuCl_3 + 3H_2C_2O_4 = 6HCl + 6CO_2 + 2Au.$$

The chlorin of the auric chlorid unites with the hydrogen of the oxalic acid to form hydrochloric acid, the copious evolution of gas noticed during the precipitation being due to the escape of the carbonic acid formed by the remaining elements of the oxalic acid. The gold is thus set free.

The so-called "shredded gold," which was somewhat extensively used by dentists in filling teeth during 1867 and 1868, was produced by the addition of sugar or gum arabic to an acid solution of gold. When precipitated gold is intended for a plate or bars, it should be well washed and fused in a new crucible. Sulfurous acid precipitates gold generally in the form of a scaly metallic powder, hence it does not afford masses sufficiently coherent or spongelike for use as a filling material for dentists. The reaction which takes place is thus explained:

$$2AuCl_3 + 3H_2SO_3 = 6HCl + 3H_2SO_4 + 2Au.$$

The water present is decomposed, its hydrogen uniting with the chlorin of the auric chlorid to form hydrochloric acid. The oxygen of the water attracted to the sulfurous acid converts it into sulfuric acid, and the gold is thus liberated.

Gold may be also reduced from solution by the electric current on a platinum pole. In this way the beautiful form of gold made by A. J. Watts of New York is produced. In a solution of auric chlorids, plates of pure gold are suspended. These are connected with a battery, so that, as the solution loses its gold by deposition of the metal, it is resupplied from the plate which forms the positive pole—the anode. By this means large masses of perfectly pure crystal gold may be obtained.

Gold remains unchanged in air and in water at all temperatures, and will not combine with oxygen. Until the researches of Mitscherlich showed that gold was soluble in selenic and iodic acids, it had always been considered insoluble in any of the simple acids. Aqua regia received its name from the fact that it was the only acid which would dissolve the king of metals.

Gold Leaf and Foil.

Gold designed for manufacture into leaf is variously alloyed, according to the color required. In filling teeth, nearly pure gold in the form of foil is used. The two varieties, cohesive and noncohesive, are extensively used in the United States at the present time, but the methods of their manipulation are widely different. In the former, the

characteristic quality of cohesiveness, which is greatly diminished by compression of the fibers in beating, is restored by heating to redness, and this is best effected by placing the gold upon a sheet of mica, which is held over a spirit lamp. The habit common among dentists of taking up the foil upon the point of an instrument or pliers and passing it through the flame is not productive of best results, as the gold is made harsh by contact with a flame, whereas, in addition to cohesiveness, it should possess some of the softness of the non-cohesive variety. Some of the manufacturers of gold foil produce a soft foil in which cohesiveness cannot be produced by annealing. This, however, may be attained by alloying, or by depositing carbon upon the surface, as this cannot be driven off by heating.

One manufacturer of dental foil states that he makes two varieties, cohesive and non-cohesive foil, from the same ingot. It seems safe to assume that the development of these qualities is due either to some surface treatment or to mechanical management during lamination, and not to alloying.

The researches of Prof. G. V. Black, published in *Dental Cosmos* for 1896, show the influence of gases and moisture on the cohesiveness of gold foil. The merits of cohesive and non-cohesive forms of foil are often unfairly presented by their advocates, but the value of each may be stated as follows: "Cohesive foil in small pieces can, with an electric plugger, be brought into most perfect apposition with the most delicate walls of enamel with comparatively little danger of fracture; non-cohesive foil in much larger masses may, with much less expenditure of time, be introduced when the walls are sufficiently strong to withstand the force required to consolidate the mats or cylinders, and affords equally good results."

Dr. Kirk states that the feeling of softness exhibited by non-cohesive foil under the instrument is due largely to the fact of its non-cohesiveness, whereby the several laminæ slip and slide one upon another, thus conveying a yielding or soft sensation to the tactile sense, and making it possible to condense large masses at a time, the pressure being conveyed continuously throughout the mass, and the condensation being uniform. A similar mass of cohesive foil treated in the same manner and under like conditions presents a greater resistance to the instrument, and conveys the idea of harshness, owing to the fact that, as pressure is applied, the successive laminæ unite or weld together from the surface downward into a homogeneous stratum of metal, which offers greater resistance and becomes more impenetrable by constant additions to its thickness, until the condensing instrument fails to make any further impression. Upon removing the mass of gold, it will be found that the portion occupying the bottom of the cavity is still in the form of foil not homogeneously condensed.

Metal Workers.

In reviewing recently a work upon "Ornamental Arts of Japan," I was deeply impressed with not only the merit and beauty of the artistically conceived and executed designs in painting, wood and ivory carving, lacquer, and cloisonné enamel work of these people, but more especially of their incrusted metal work in bronze, gold, silver, copper, and alloys. One particular specimen of their art work in metal, of the class known as *syakfdo,*

in which the Japanese are unapproachable masters, completely captivated my artistic sense and appreciation of the beautiful by the conception and execution of this particular design. It represented a superb specimen of this work, being a wrought-iron dish of some sixteen inches diameter, with medallioned center inlaid and incrusted with gold, silver, copper, and certain alloys. The face of the medallion was most expressively modeled in iron darkly browned, with eyes of silver and *shakudo,* the latter being an alloy of copper, gold, silver, iron, and antimony, teeth in silver, and tongue in deep red copper. The background of this dish was formed of damascened work of microscopic minuteness executed in *coban*—an alloy of gold 10 parts, silver 2.6 parts. Looking at this representation of their art in metal work and knowledge of metallurgy, one reflects, What may not be expected of such a people in the future, if their knowledge of this science, coupled with daring conceptions, deftness of hand, and masterful execution of design, are applied to dentistry? Past-masters as they are in such processes of decorative art as inlaying, damascening, champlevé, enameling and niello work, incrustations of metal by the Japanese are very common, and are invariably beautiful and highly artistic objects. The various colors of bronze produced by the Japanese metallurgists, and the skill with which these objects are cast, chased, and inlaid with gold and silver by native metal workers, furnish ample scope for the artists to display their ingenuity and taste. Upward of one thousand years ago the status reached by the Japanese in the art of metal fabrication was remarkably high, and many of the products of these early ages of art culture demonstrated a breadth of conception and a courage of effort that could only emanate from an intellectual and energetic race.

It may be of interest to the gold inlay workers of our profession today, disciples of Taggart and others, to know that bells and bronze castings and all manner of intricate and beautiful inlay designs, first molded in wax models, were cast by the Japanese in the early part of the seventh century, more than seven hundred years prior to the discovery of America.

As metallurgists and art workmen in metals, the Japanese may safely be pronounced as unexcelled. As dentists we are specially interested in their knowledge of the properties of the metals and their alloys, and their skilful manipulation in works of utility and beauty.

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Discussion.

Dr. B. HOLLY SMITH, Baltimore, Md. The scientific way in which the essayist approached his subject made me hope that he had something practical to offer. I rise to emphasize the usefulness of gold foil as a filling material rather than to discuss the paper critically. It is known to us all that the manufacture of what is known as non-cohesive gold happened to be the secret of one man, who died without having revealed it; Abbey's non-cohesive gold can no longer be purchased. There is no gold of this

kind manufactured in America which can be favorably compared with that product.

While I appreciate the ability with which the essayist described the wonderful workmanship of the orientals in the use of gold for ornamental purposes and in the arts, I had hoped that he would tell us what method would produce something like Abbey's non-cohesive gold. A number of our manufacturers produce a non-cohesive gold which is made cohesive by annealing, but Abbey's gold was not affected that way.

A distinguished gentlemen from New York has said that the chief virtue of non-cohesive gold was the readiness with which it might be removed, should an abscess occur. I do not believe that. There is no reason why a non-cohesive gold filling should not be as dense and have as high specific gravity as cohesive gold. I saw this tested out in Baltimore once, when Dr. Head made the claim that he could introduce more cohesive gold in a given space than it was possible to do with non-cohesive gold. The test was accordingly made, and the man who worked with non-cohesive gold obtained a higher specific gravity than Dr. Head did, who consequently lost his wager.

I would like to have Dr. Teague bend his energies to showing us and the manufacturers how to produce a gold that will compare favorably with that made by Abbey.

Dr. M. D. Huff, Atlanta, Ga. The essayist, as is his custom, has presented us with a beautiful, scientific, and symmetrical paper.

In the production of gold by the wet process with aqua regia, the latest formula for aqua regia, as recognized by the pharmacopeia, is 820 grams of hydrochloric acid to 180 grams of nitric acid. This seems to be the proportion now used and officially recognized.

As to the working of gold, we are obliged, of course, to admire greatly the work of the Japanese, but as American dentists we can derive a great deal of consolation from the fact that we do not have to doff our hats to any other race, American dentistry standing at the head in the accomplishments in actual tooth preservation by the application of gold.

I would like to ask the essayist if, in his research, he has been able to find any reason why non-cohesive gold seems to exert a preservative influence upon tooth structure to a greater degree than does cohesive gold.

Dr. Wms. Donnally, Washington. I wish to speak of one feature that has been brought out in the paper, namely, the use of disappearing models of wax in connection with the Taggart patent. A study of this matter, which has been made in Washington, has shown that the Egpytians made castings from disappearing wax models more than eighteen hundred years ago. It has also been shown that Dr. Hollingsworth, Dr. Simpson, and other dentists did work in this way years before the Taggart patent was granted. The practical and general use of this method, and the machine for it, are undoubtedly largely due to Dr. Taggart, who demonstrated his ideas to the profession in New York some years ago, thereby connecting his name officially with the cast gold inlay.

This, as well as many other instances, shows that we are doing today practically the same things that were done hundreds of years ago, and are talking about them as new discoveries.

Dr. Smith. I would like to make an

explanation with regard to my previous remarks. I did not mean to reflect on any manufacturer's gold foil when I made the statement that there had never been any foil produced in this country which compared favorably with Abbey's. I meant to say that no other foil has been produced which could be manipulated in the manner in which we manipulated Abbey's gold. Globe foil, manufactured by White, is non-cohesive, but we can, in manipulation, impart to it the cohesive quality. The foil that resembles Abbey's most closely is Woolrab's. I have introduced a good many fillings of Globe foil, but it has always been an embarrassment to me, in the insertion of such a filling, to find a cohesive quality caused by the manipulation of the gold. I do not say that good fillings cannot be made with this gold, but, unlike Abbey's, it seems to possess a strange quality, which is embarrassing to me.

Dr. S. W. Foster, Atlanta, Ga., complimented the essayist on his paper, and thanked him for his contribution.

Dr. Teague (closing the discussion). In closing the discussion I wish to thank you for the courteous reception accorded to my paper. I fully appreciate the difficulty of discussing offhand a paper on chemistry or metallurgy. However, if by this review of certain chemical and metallurgical changes that take place in metals, any of my hearers should be impelled toward further investigation and research, my efforts to stimulate interest in this direction shall not have been in vain.

I am unable to answer Dr. Smith's question as to how non-cohesive foil is made.

Dr. Smith. Gold foil is naturally cohesive, but I asked how non-cohesiveness was secured in the old foils.

Dr. Teague. I cannot answer that. I have not been able to find how that is done, but I shall keep on trying.

With regard to Dr. Huff's question as to whether non-cohesive gold preserves the teeth better than cohesive, I do not know whether there is any preservative quality in the gold itself. The explanation is to be found in the workmanship of the practitioners forty and fifty years ago. It seems to be a fact, however, that non-cohesive foil has a more preservative effect on tooth structure than cohesive gold, as we have seen a great many non-cohesive gold fillings which have preserved the teeth for fifty years, but never a cohesive filling that has lasted nearly that long.

The next order of business was the reading of a paper by Dr. I. N. Carr, Durham, N. C., entitled "Electricity in Dentistry." [See following page.]

Electricity in Dentistry.

By Dr. I. N. CARR, Durham, N. C.

In order to practice dentistry today successfully, it is imperative that we have a broader theoretical knowledge of all that pertains to it, together with a more exact clinical skill than has been required of the profession in the past, for the reason that much more is now expected of us. The public is being educated up to the possibilities of dentistry, and demands more. The field of dentistry has been so greatly enlarged that many operations are now undertaken which formerly were turned over to the general practitioner of medicine. While this tends to dignify our profession and place it upon a higher plane than it has hitherto reached, yet with its advance comes the necessity for a broader and deeper knowledge on the part of all who essay to practice it. There is no such thing as standing still; we must either go forward or retrograde, and while this enlarged field of practice has added greatly not only to its usefulness to the general public, but also to the dignity of the profession and the compensation which it brings, it has at the same time necessitated more in the way of equipment to satisfy the advanced conditions and greater exactions.

COMPRESSED AIR FOR MOUTH-CLEANSING PURPOSES.

To my mind, no greater aid has been rendered the profession than electricity supplied through a good switchboard, by which the current is easily controlled. For several years we have been studying with more assiduity than ever before the pathological conditions and therapeutic treatment of oral diseases, and special study has been devoted to prophylaxis. Here electricity and pneumatics play a very important part. In the following I shall endeavor to point out some of the many uses which we can make of electricity in our daily practice. Let us see what help we can derive from an up-to-date switchboard and compressed-air outfit, and study some of the specific instances in which, as clinical experience has shown, this equipment increases operative efficiency, saves time and energy for the operator, and contributes to the ease and comfort of the patient. With the idea of sanitation in mind, when the patient takes the chair we first attach the compressed-air tube to an atomizer bottle and spray the mouth, throat, and teeth with a good antiseptic solution. The pressure used for this purpose is 15 or 20 lb., which can be easily regulated on the switchboard by a regulator. Suppose air has been pumped into the tank up to a pressure of 50 lb.; this amount can be reduced by means of the regulator to 5 lb., as is desirable for a spray bottle, or to any pressure below 50 lb. By spraying thoroughly, the mouth is rendered comparatively clean to operate in, which is certainly advantageous and pleasant to the operator, as well as beneficial to the patient.

COMPRESSED AIR IN PYORRHEA TREATMENT.

Besides spraying the mouth with the aid of air pressure, a gold point can be

inserted between the teeth, and medicaments can be forced as far down and around the roots with as much air pressure as desired. I sometimes use from 40 to 50 lb. pressure in pyorrhea cases, washing out thoroughly all accumulations that may be present, thus producing a clear and clean field for instrumentation. After all deposits have been removed, the gold applicator is again brought into requisition, and all débris is forced out, after which one's favorite pyorrhea remedy can be applied with the expectation of good results.

USES OF THE HOT-AIR SYRINGE.

Another very valuable appliance to be used in connection with the switchboard is the hot-air syringe. By means of the transformer rheostat, the current can be regulated so as to produce a constant current of either warm or hot air. The air-regulator governs the pressure, so that a very gentle or a strong stream of warm air is furnished. When used instead of the old-fashioned chip-blower, this appliance is both sanitary and effective, and the degree of heat can be regulated to a nicety. It imparts an agreeable instead of a painful sensation to the patient when the chips are being blown from a cavity during the process of burring or excavating. Moreover, the use of the hot-air syringe while the dam is in place will reveal any decalcified spots in the enamel which the eye would not notice unless the tooth is entirely or nearly desiccated. An etherial solution of cocain applied to a desiccated tooth is readily taken up by the protoplasm in the tubuli of the dentin, which enables the operator to excavate almost painlessly. For drying out root-canals and vaporizing eucalyptus oil and iodoform, for instance, it is of inestimable service. In short, the many purposes for which this appliance can be utilized in facilitating the work and accomplishing the desired ends most effectually are nothing short of marvelous.

The hot-air syringe may also be employed advantageously when filling root-canals with gutta-percha points. After a point of suitable size has been inserted as far as possible, the nozzle of the syringe is held close to the protruding end of gutta-percha, which is softened with the hot air. The point can then be packed thoroughly into the canal, sealing it hermetically. It is also of great value for drying abutments in crown and bridge work, since the cement holds better and sets more quickly. The advantage of having at one's disposal at all times a constant flow of filtered air, under absolute control as to volume and temperature, is inestimable.

THE ROOT-DRYER.

Another valuable instrument is the root-dryer. This consists of a very fine, flexible silver point, which can be inserted to the apex of almost any root-canal, and dehydration of a canal to any desired extent is easily and quickly accomplished without danger of injuring the peridental membrane. The degree of heat is easily regulated from the switchboard. Patients are advised to lift the left hand as soon as the point becomes too hot; in this way all danger of overheating is avoided.

DIAGNOSTIC LAMP FOR EXAMINATION OF THE MOUTH.

For a thorough examination of the mouth and teeth the aid of a diagnostic

or antrum lamp is invaluable. To use this lamp most successfully, a camera cloth is thrown over the head of both patient and operator. Its wonderful luminosity will reveal pulp conditions as nothing else will, and the proximal surfaces and interproximal spaces may readily be examined. A first-class radiograph could not show up conditions much, if any better. We can rely upon this lamp to reveal conditions as they exist, and we are thus enabled to apply our remedies more intelligently. For superficial examinations the mouth-lamp is very serviceable; indeed, I now use it almost to the exclusion of the ordinary mouth-mirrors.

THE ELECTRIC CAUTERY.

With the electric cautery many operations can be done painlessly and scientifically. An abscess cannot by any method be opened more thoroughly and with less pain than by the quick application of the actual cautery. The platinum loop, when at white heat or incandescent, is practically painless, while a red-hot wire would cause pain. For removing hypertrophied tissue, overhanging cavity walls, and filling the interstitial spaces, it is unexcelled. It leaves no bloody trail behind it to interfere with the operator's work. Instead of using the lancet and curved shears for removing the tissue overlying painfully erupting third molars, we use the cautery, to much better advantage and with considerably less, if with any, pain. Its superiority over the knife and caustics will readily commend itself upon trial.

For stopping the exudation of blood serum from the gum margin, the flow of which would interfere with the placing of porcelain or gold crowns and bridges, the cautery is most excellent, and is unequaled as a time-saver.

OTHER VALUABLE ATTACHMENTS OF THE SWITCHBOARD.

Many other instruments and appliances are connected with a well-equipped switchboard, such as gutta-percha instruments, which can be kept at a certain temperature while packing this material into cavities, or around the pins in vulcanite work. The bleacher point is used for the volatilization of pyrozone and other bleaching agents, and accomplishes the work in very much less time than any other method with which I am familiar. The wax spatula is another handy little instrument, and very effective, as well as a time-saver.

All these and many other uses to which electricity can be put for facilitating dental work, amply repay the practitioner for the investment in an up-to-date switchboard and accessories.

Discussion.

Dr. H. W. Campbell, Suffolk, Va. One of the principal points of the paper was the sterilization of the mouth by the spray prior to operation. I believe that before any work is done in a mouth, it should be thoroughly sprayed and disinfected. This has been duly emphasized yesterday in Dr. Skinner's paper on oral prophylaxis. In connection with the spray, the use of the disclosing solution which Dr. Skinner referred to would be admirable. Preventive medicine is occupying the minds of the medical profession today, and should take a firmer hold of the dental profession. Many think too much of the

social feature of these meetings, and probably go away content in their ignorance, instead of receiving an inspiration for new methods and real research work. If more of us engaged in scientific research, we would make more rapid strides.

Dr. Robin Adair, Atlanta, Ga. The best friend I have in my office is the compressed-air equipment, because of its valuable assistance in prophylaxis in pyorrhea.

I would like to speak for a moment on one or two practical points concerning this subject. First, the spray outfit. The compressed air which is furnished in some office buildings is unfit for use in the patient's mouth, as it is compressed in a basement where there is more or less foul air, dust, etc. When this air is blown through a piece of cloth, it is surprising to note how much impurity it contains. It is a very easy matter to filter such air before using it with an improvised filter made in the following manner: A piece of pipe, two inches in diameter and six inches in length, is loosely plugged with cotton and connected with the air-supply pipe. Once a month this pipe section is removed, and the cotton renewed, when it will be found to be almost black with filth, and laden with bacteria, water, etc.

If the operator does not have a hot-air syringe, hot air may be supplied in the winter time simply by placing a small Bunsen burner at a point about three feet from where the pipe enters the tubing. This burner is lighted in the morning, and will heat the air all through the day. This appliance works on the same principle as a water-back in a stove. I find that in pyorrhea work hot air is one of the best means of diagnosis. Sometimes we cannot introduce a probe into a pocket, but with compressed air and a fine syringe point we can distend the gum, and, if we have used the disclosing solution, make a diagnosis.

In using the disclosing solution, one should be cautious not to spread it all over the mouth.

In regard to pressure, I have never found it necessary to use a reducing valve. I should like to increase the pressure to above forty pounds, because I have never yet found enough pressure for my work.

There is one point in connection with prophylactic work that I would like to emphasize. In using the spray the current of air should be directed against the teeth in this way [illustrating]. One of the greatest troubles we have in prophylactic work is leaving pumice at the free margin of the gum. The stream of air should be directed so that it will wash these pumice crystals away, because they are an irritant and cause a great deal of damage.

The electric surgical lamp is one of the most valuable aids in diagnosing dead teeth and in filling root-canals. I am always interested in anything that has to do with electricity, because of the many uses to which it can be put. Dr. Kelley of Portland suggested to me the use of a nasal spray with a big bulb on it. By placing a finger above it and applying it between the teeth, we can clean the interstices most thoroughly.

In every office a lot of samples are left, and of these I dispose by pouring them all into a nasal douche bottle, and using the mixture as a spraying solution.

I use Dr. Skinner's disclosing solution entirely, as it is the only one I have ever been able to use successfully.

Dr. Ewald. Dr. Adair speaks of using over forty pounds of pressure in pyorrhea pockets. I have never seen him use it, but I would like to know how he protects himself from the result of forty pounds of pressure in a pocket.

Dr. Adair. I had reference to the spray syringe.

Dr. Ewald. I mean the spray.

Dr. Adair. I use a chip-blower which has forty pounds' pressure to distend the pocket. When I use the spray I allow the pressure to get to the point of forty pounds, and we hardly feel it. I think in the clinic yesterday Dr. Skinner used the Dunlop vapor under thirty and forty pounds of pressure.

Dr. De Los Hill, Atlanta, Ga. I might say that I could almost as well dispense with my engine as with my electrical appliances or electrical switchboard. A well-equipped switchboard, with which he can control every instrument to such advantage, is the best investment of sixty or seventy-five dollars that the dentist can make. I take it for granted that every owner of a switchboard uses a water-heater. This, in connection with the spray, is one of the most valuable attachments. It is most unpleasant to put cold water in the mouth, especially for persons with hypersensitive teeth, and they greatly appreciate tepid water. I had a switchboard designed and made with the attachments in the back, which gives a great deal better appearance to the office than one with a lot of wires dangling from it. If there is anything that looks badly and is difficult to keep clean and presentable, it is the four sets of wires in the average switchboard, which catch every particle of dirt and dust when the office is being cleaned. For that reason I have them concealed, which produces a great deal better appearance.

There are in the switchboard many other features, too numerous to mention, that I would not be without.

Dr. F. H. Skinner, Chicago. Dr. Adair spoke of using compressed air for locating pyorrhea pockets. Wherever there is gingivitis, there is an irritant which is sometimes difficult to find. It may be a bacterial accumulation on the side of the tooth, a rough filling, a rough tooth surface, or a pyorrhea pocket just starting. The last-named condition is sometimes difficult to diagnose, for the gum hugs the tooth very tightly, until the vitality of the dental ligament is lost. With low pressure in the Dunlop vapor machine and a long, slender, blunt needle, known as the Robert Good pyorrhea needle, I have been able to blow the tissue back and detect deposits which I would have overlooked without this outfit. Compressed air can be applied in the same way for diagnostic purposes.

Dr. Carr (closing the discussion). In regard to the water-heater, every well-equipped switchboard should have one. Dr. Adair spoke of not being able to obtain sufficient pressure. To those who do not want to invest money in an electrical pump, I would suggest the following arrangement: I have in my office an ordinary beer pump attached to a twelve-gallon tank, this pump being run by water. This pump is kept running automatically all the time, giving a constant pressure of sixty pounds, which is easily regulated by the outlet cock. I wish to thank the audience for the kind reception accorded to my paper.

The Executive Committee, through the chairman, Dr. Turner, asked the sense

of the association with regard to the election of officers.

Dr. B. Holly Smith moved that the election of officers be set for 12 o'clock. [Motion carried.]

The next order of business was the reading of a paper by Dr. H. W. Morgan, Nashville, Tenn., entitled "Dental Education." This paper was read by the secretary, Dr. Dean, as follows:

Dental Education.

By HENRY W. MORGAN, M.D., D.D.S., Nashville, Tenn.

Thirty years' experience in any vocation brings many changes, teaches many lessons, alters many plans. Your essayist, when preparing this report on dental education, found that it is less difficult to teach, tell about the concrete, the tangible, to organize and direct the conduct of a school, than to enter into a discussion of its great object, viz, the preparation of those who seek to obtain by its means the requisite equipment for their life-work. In the discussion of the subject, this paper will deal with it in a somewhat restricted sense.

A review of the literature bearing on dental education, of the discussions which the subject has evoked, and of school catalogs, reveals a diversity of opinions and a variety of organizations such as to convince one that, as a science, dental education is still in its youth—vigorous, earnest, and healthy, to be sure, yet no one is prepared to assert that even a rational curriculum has been fully agreed upon.

THE EVOLUTION OF DENTAL EDUCATION.

The history of dental education is necessarily a history of experimentation. It cannot be claimed that the ideal plan for a scientific education has as yet been attained.

An analysis of what is offered in college catalogs amply supports this contention, and, while much information is gained from this source, one cannot but be impressed with the diversity of plans presented. These catalogs furnish much food for thought, and from them the practitioners of our profession should derive a knowledge of this subject, instead of relying upon a personal acquaintance of what certain colleges were in the past.

The schools of twenty years ago deserve more than the memory of their shortcomings and the fact that few, if any, were accomplishing what is being done today. They were the pioneers, as were the great men whose names are associated with them, and were necessary in the evolution which has been going on so rapidly and effectively.

UNJUST CRITICISM.

What have been termed "loose criticism" and "unjust attacks" upon colleges have been a stimulus which has stirred hearts and minds to bringing about better conditions, and out of these unfavorable comments has come much material progress, though they wounded at the time.

No age has poured out such a wealth of energy upon education as our own. In no period of our history have those in charge of the work tried so hard, paid

so lavishly, or sacrificed so much to afford every opportunity for a broad, intellectual foundation for a professional training; yet never has there been such critical discontent with dental education —this in the face of the fact that graduates of dentistry of today are better prepared to begin their work than are those of other professions.

These criticisms do not always come from the informed, are not the result of a careful investigation and study of the efforts put forth, but too frequently come from men with impractical theories that have been tried and have proved failures, or are based upon a few cases which were at variance with the views of these critics.

THE STUDENT'S MOTIVES IN SELECTING A DENTAL SCHOOL.

The young man who gives any thought to the selection of his school, in looking over the field finds various types from which to choose, and his choice is often made from motives which have little to do with his intellectual equipment or efficiency as a professional man. Sentiment is too often a dominant factor. He seems to be obsessed with the idea that, if he can gather sufficient knowledge to "get by" the faculty, obtain his degree and pass a state board of examiners, his equipment for the battle of life is complete.

DEFECTS IN THE AIMS AND CURRICULA OF SCHOOLS.

Our whole system of education seems to have drifted into one of "graduation" instead of "education"—a cramming process in which the demand is, how many things can be crowded into the three years, while in reality it is only possible to lay a foundation for future development. The student too often takes the short cut, only to find himself early clamoring for postgraduate work, having failed to avail himself of his opportunities. This is no fault of the college, but in our opinion the overcrowding of the system has much to do with it.

Fewer subjects, eliminating those of purely cultural value, more thorough grounding in the philosophy of the work, and thoroughness in all elementary consideration of each, will lead to a more earnest studenthood, and arouse ambition in a larger percentage, than is being accomplished by present-day methods.

THE TYPES OF DENTAL SCHOOLS.

A survey of the dental catalogs of our country reveals the existence of the following types of schools:

(1) There are institutions founded upon the idea that dental training should be had from dentists, in other words, that instruction in all the subjects taught should be given by practitioners of dentistry.

(2) The institutions in which dental subjects are in charge of dentists, and the fundamental work is done by medical graduates.

(3) University dental schools, in which the dental subjects are being taught by practitioners of dentistry, or those who have been practitioners, and instruction in the fundamentals is being given in conjunction with medical classes.

(4) University departments, where the strictly dental subjects are covered by dentists, and the training in the fundamental subjects is given by medical graduates in separate and specialized courses *adjusted to fit the needs of the dental student.*

A study of these brief summaries and a careful weighing of the causes that

have led to their development will sustain the statement made above, that those interested in dental education have been experimenting, and have tried first one plan and then another.

A BROADER VIEWPOINT ADVOCATED.

The progress achieved, which is based upon the sciences on which all knowledge of the healing art rests, has been great. As knowledge increases, more and more time is required to cover the subjects taught, and the work must and will become more and more specialized. To expect the best results and broadest culture, the scientific side of the fundamentals must be emphasized not only as so much science, but as so much essential knowledge with a broad medical application to dentistry.

It would be too much to expect this from any and all schools. The school of the future must become an *infant bureau of research,* if this term may be used, but all this work must have a restricted or specialized dental point of view. The foundation should be thorough, comprehensive, and broad, but the application should be *dental.*

If these conclusions are correct we must look for the separate training of dental students to become universal. The reasons are apparent and must not be overlooked nor idly brushed aside.

In the endeavor to train dental students with the medical student, many essentials which the dentist should know in chemistry, metallurgy, histology, pathology, anatomy, surgery, etc., must be omitted, or else the time of the medical student is consumed in the consideration of much that is not essential to his education. In anatomy alone, two months of additional study would be required. It is for these reasons that many schools which were formerly conducted like those in class "(3)" have come to accept the methods of class "(4)".

We are living in an "age of transition"—not, as is often implied, of "instability of things," but one in which clear heads are preparing the way for greater things. We invite criticism, but it must be just, and the critic must be competent to speak from intimate knowledge and experience. He must not be a convert of yesterday, nor the exponent of an untried scheme, nor yet the advocate of a long-exploded idea.

THE PROFESSION'S DUTY.

The dental profession of America owes it to the future student, to itself, and to humanity, to be informed, and to so direct the dentist of the future that he may make no mistake in his effort to become a respected member of our great profession and a qualified servant of humanity.

Dr. Hill, chairman of the Clinic Committee, reported that clinics would be given in the afternoon in accordance with the printed program.

Dr. Brabson, treasurer, then made the following report:

REPORT OF THE TREASURER.

Receipts.

Balance on hand from 1912	$184.73
Dues collected, 152 at $5 each	760.00
	$944.73

Disbursements.

Paid Treasurer National Dental Association	$589.00
Printing	1.50
Stamps and expressage	7.50
Badges	6.25
Treasurer's expenses	49.25
	$653.50
Balance on hand for 1913	$291.23

Respectfully submitted,

B. D. Brabson, *Treasurer.*

Motion was made and carried that the Report of the Treasurer be accepted.

The next order of business was the selection of the place of the next annual meeting. The vote of the association was taken, and Atlanta was selected as the place for the next meeting.

Election of Officers.

The next order of business was the election of officers for the ensuing year, which resulted as follows:

President—Dr. W. A. Dean, Tampa, Fla.

First Vice-president—Dr. R. W. Carroll, Beaumont, Texas.

Second Vice-president—Dr. M. D. Huff, Atlanta, Ga.

Third Vice-president—Dr. T. T. Moore, Jr., Columbia, S. C.

Recording Secretary—Dr. Joseph Eby, Atlanta, Ga.

Corresponding Secretary—Dr. J. L. Williams, Jacksonville, Fla.

Treasurer—Dr. B. D. Brabson, Knoxville, Tenn.

Executive Committee—Dr. N. A. Teague and Dr. J. E. Chace, to take the places of Dr. H. C. Hassell and Dr. R. W. Carroll.

The next order of business was the installation of the newly elected officers, after which the association adjourned *sine die.*